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RESOURCE ACTION PROGRAM



COLUMBIA - PACIFIC

RESOURCE CONSERVATION AND DEVELOPMENT PROJECT
STATE OF WASHINGTON

JUNE 1972

ASSISTED BY
U.S. DEPARTMENT OF AGRICULTURE AND OTHER COOPERATING AGENCIES

3-7-63

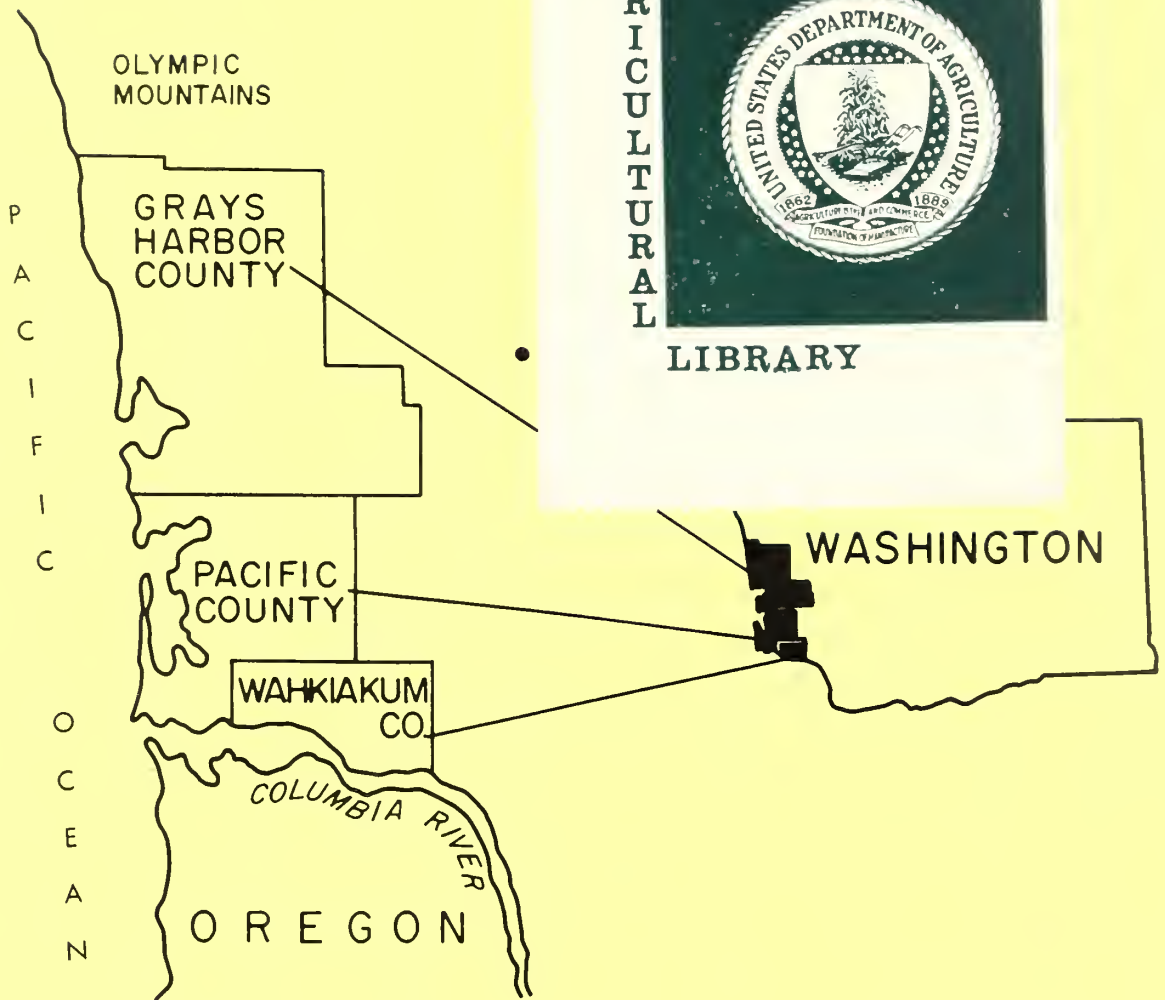
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U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE
SPOKANE, WASHINGTON

COLUMBIA - PACIFIC

RESOURCE CONSERVATION AND DEVELOPMENT PROJECT

This resource action program was prepared by the following sponsors:

City of Cathlamet

City of Raymond

City of South Bend

Grays Harbor County Commissioners

Grays Harbor Soil and Water Conservation District

Pacific County Commissioners

Pacific Soil and Water Conservation District

Port of Willapa Harbor

Wahkiakum County Commissioners

Wahkiakum Port District #1

Wahkiakum Port District #2

Wahkiakum Soil and Water Conservation District

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CATALOGING - PREP.

Assisted by:

U. S. D. A. Soil Conservation Service and other cooperating
local, state and federal agencies.

Prepared under authorization of:

Food and Agriculture Act of 1962; United States Congress,
Public Law 87-703.

FOREWORD

The sponsors of the Columbia-Pacific Resource Conservation and Development Project present this Resource Action Program for your consideration in our combined effort to promote the orderly development and conservation of our natural resources.

This action program has been developed as a result of countless hours of thoughtful consideration by local people - the residents of Grays Harbor, Pacific, and Wahkiakum counties.

These folks represent all major walks of life found here including: the farmer, the fisherman, the lumberman, the businessman and the housewife.

We have joined together in an effort to apply our decisions for betterment of the area in which we live, work, and play.

Through careful study of the information in this Resource Action Program any individuals, groups, or agencies may direct their efforts to the solution of the problems we have outlined herein.

It is the desire of the sponsors that you direct your attention to the many agencies recognized in our "acknowledgements" whose enthusiastic support with advice and technical data made possible the depth of our presentation.

It is our hope that this action program will be the beginning of an ever increasing effort by the people who live here to make this area an even better place in which to live.

It is a pleasure to present this "people's plan for proper progress" through the Columbia-Pacific RC&D Project.

Donald J. Bale, President
RC&D Executive Board

PROJECT GOALS*

The following broad goals were agreed on by the sponsors of the Columbia-Pacific RC&D Project. The accomplishment of these goals will improve the economic and social well-being of the people in the project area. It will also make this area a better place in which to live, work, and play :

1. To promote the use and development of land and water resources in a manner that will protect the environment and best serve the area's domestic, agricultural, recreational and industrial needs.
2. To promote the utilization and marketing of forest products in order to broaden the small business base, utilize waste products, and provide more non-seasonal employment.
3. To promote those activities which will reverse the outward migration of young people from our project area.
4. To promote legislation and other sound efforts which will protect our agricultural and forest land resources, as well as the owners and the public who require the products of those lands.
5. To promote human resource developments in the fields of health, education, and welfare which will enhance living conditions through more and better housing; better health, medical and educational facilities including sewage treatment and solid waste disposal, and improved transportation, communication and utilities systems.
6. To promote the preservation and/or restoration of the historic sites of Indian and other early ethnic settlers in the project area.
7. To promote activities which will preserve, develop and enhance the beauty of the project area.
8. To promote the preservation of unique natural areas and keep open spaces and also promote the development of public outdoor recreation facilities needed to meet the anticipated demands of residential growth as well as those of increased tourism.
9. To promote programs and activities which will enhance the habitat and populations of the fish and wildlife in the project area.
10. To promote accelerated technical and financial assistance of state and federal agencies in order to meet our project objectives.
11. To provide a multi-county framework for resource planning and development.
12. To provide an organization in which cities, counties, special districts, and local lay people in the project area cooperate to plan and develop their resources.

* See Glossary for definition of terms

SUMMARY

The Columbia-Pacific Resource Conservation and Development Project is located in the three southwest coastal counties of the State of Washington. The Columbia River forms the southern boundary; the Olympic Mountains form the northern boundary; and the Pacific Ocean shoreline is the western boundary. The project encompasses approximately 1,970,368 acres.

The Resource Action Program describes some of the problems, opportunities, needs and objectives of the 78,941 people living in the project area. It also attempts to recognize and deal with the problems caused by the influx of millions of tourists to this coastal recreation area each year.

The Columbia-Pacific RC&D Project is governed by an Executive Board made up of representatives of the sponsors listed on the preceding pages. The organization is an independent, non-profit, non-partisan association having as its primary concern the proper development of the resources in the project area.

The purpose of the project is to enable citizens to meet local needs through a cooperative and coordinated multi-county effort assisted by private groups, local, state, and federal agencies.

The citizens of the tri-county project are its greatest resource, and this program is designed to help develop their potential and provide them with a quality environment.

After nearly a century of harvesting forest products this highly productive forest land continues to be a major supplier of wood fiber to the State of Washington, the nation, and the export markets of the world.

The area has long been recognized as one of the best timber growing regions of North America. This high productive capability is due to a combination of favorable climatic conditions and soils. The three counties have an inventory of 42.5 billion board feet of sawtimber consisting of hemlock, Douglas fir, Western redcedar, and Sitka spruce.

The approximate value of the 1970 harvest delivered at the mill was \$89,000,000. The annual value of shingles and shakes produced in the project area is approximately \$24,000,000. The volume of logs exported during 1970 was about 416 million board feet. Approximately 8,000 people are employed by forest related industries.

The regeneration of logged off lands by small landowners is a major problem. Erosion is a problem and logging roads are one of the major sources of sediment in streams. The entire project area has a limited small business base to remanufacture the wood products or wastes that are produced here. A forest products utilization and marketing specialist is needed to assist small timber owners and communities.

The proportion of the area's land in farms is low compared with the state and the nation yet agricultural trends follow the national pattern: fewer farms, less total acres of land in farms, fewer farmers, and an increase in average size of farms. The market value of all agricultural products exclusive of forest products was \$10,489,820 in 1969. The value of livestock products is about four times that of crops.

The disposal of animal wastes, streambank erosion, low fertility pastures with high water tables and poor drainage, pressures from housing and recreation sub-divisions, and unfair taxation based on "comparative sales" are the major problems affecting agriculture.

Commercial fisheries within the project area in order of greatest value include salmon, crab, and oysters. The total value amounted to \$9,987,000 in 1969. Water quality is a big factor in maintaining a strong commercial and sport fishery.

The biggest health care problem is the need for emergency facilities in some remote areas of the project. This problem is magnified by the great fluctuation in winter and summer populations.

The major problems of solid waste disposal are the lack of either good sites for sanitary land fill or economically feasible disposal methods. Another factor is the cost of collection over large, thinly populated rural areas. This problem, too, is magnified by the summer tourist "population explosion".

Most rural population centers need installation or improvement of sewer systems. A high percentage of the soils in the project are not suited to septic tank disposal. Here again the summer population taxes the facilities but does not directly finance their installation or upkeep.

New or improved water systems are needed by many of our rural communities. Water storage is lacking although potential sites exist. Present surface and ground water sources are easily contaminated if not properly planned and developed.

Critical land areas that must be properly planned for are our immense expanse of shoreline, our tidelands, and our flood plains.

The most important factor contributing to the recreation industry is the Pacific Ocean, its beaches and the fishing, clamming, and other shoreline and water related activities associated with it. The biggest recreational problem in the project area is the tremendous impact that the thousands of tourists have on local sanitation and highway facilities.

Benefits from the project measures identified in this program of action are many and varied. They include environmental quality, pollution control, beautification, improved water quality, and improved fish and wildlife resources. Direct benefits will accrue to the area from development or improvement of a resource use as well as from direct construction investment for that development.

Measures costing nearly \$5,000,000 have been approved by the Executive Board for some kind of action during the first five years of operation. Secondary benefits include increased employment opportunities, both during project construction and for their operation and maintenance. Man years of employment resulting from project construction could approximate 360 in these five years. Multiplier benefits are brought about when increased employment or additional income accelerates business activity in the immediate or surrounding communities. It has been determined that for every \$1.00 spent on construction \$1.93 will be returned to the project area due to the multiplier effect.

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Looking eastward toward the Columbia River north jetty and Cape Disappointment, on the southwestern tip of Pacific County, Washington. Ilwaco is in the upper left-hand corner of the photograph, and the Cape Disappointment Lighthouse in the upper center. Note the large area of sandflat that has filled in north (left) of the jetty since it was first completed in 1917; this area is now part of Fort Canby State Park.

CORPS OF ENGINEERS PHOTO



WESTPORT LIGHTHOUSE



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*COLOR



STATE OF WASHINGTON

OFFICE OF THE GOVERNOR

OLYMPIA

DANIEL J. EVANS
GOVERNOR

May 9, 1972

Mr. Donald J. Bale
Executive Board President
Columbia-Pacific RC&D Project
P. O. Box 632
Raymond, Washington 98577



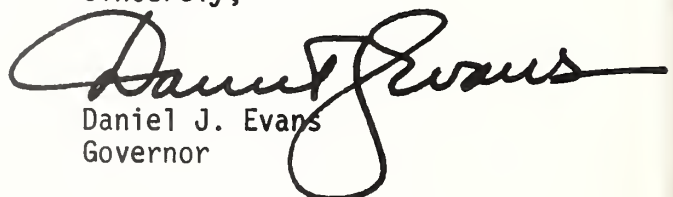
Dear Mr. Bale:

It is my pleasure to review the Resource Action Program of the Columbia-Pacific Resource Conservation and Development Project. I am pleased to endorse this very worthwhile program and urge that adequate funding be provided at the earliest possible date to implement the various project measures included in your first year of operations.

This program reflects untold hours of work by many interested citizens in the project area, which I consider to be one of the most unique in our State as it relates to resources and historic and social values. Your action program reflects a strong desire by the local citizens to develop and use these resources in a manner consistent with proper resource management and environmental principles.

I wish you every success in moving ahead with this program and ask that you express my congratulations to the many people who assisted in the development of it.

Sincerely,


Daniel J. Evans
Governor

DJE:gd

THE SPONSORS

As sponsors of the Columbia-Pacific Resource Conservation and Development Project, we hereby approve this Resource Action Program.

City of Cathlamet

This action authorized at an
official meeting of the City
Council

By: Melvin E. Irving on 5/1/72
Mayor

Date 4/17/72 attest: J. Agnes Foster
City Clerk

City of Raymond

This action authorized at an
official meeting of the City
Commission

By: Margaret Foster on April 17th, 1972
Mayor

Date 4/17/72 attest: Margaret Foster
City Clerk

City of South Bend

This action authorized at an
official meeting of the City
Council

By: Walter J. Knauer on April 13, 1972
Mayor

Date April 13, 1972 attest: A. M. Bond
City Clerk

Grays Harbor County Commissioners

By: R. F. Simmons
Commissioner

May 30, 1972
Date

This action authorized at an
official meeting of the Board
of County Commissioners

on May 30, 1972

attest: Ethel C. Truitt
~~County Clerk~~ Secretary

Grays Harbor Soil and Water
Conservation District

By: John W. Holcombe
Chairman

April 18, 1972
Date

This action authorized at an
official meeting of the
District Supervisors

on April 25 - 72

attest: Garrett G. Gorman
Secretary

Pacific County Commissioners

Edna Bentica
By: Don Bates
Commissioner

May 1, 1972
Date

This action authorized at an
official meeting of the Board
of County Commissioners

on May 1, 1972

attest: Yvonne Jackson Pac Co. Cl.
County Clerk of the Board

Pacific Soil and Water
Conservation District

By: Wm. J. Gault
Chairman

4-28-72
Date

This action authorized at an
official meeting of the
District Supervisors

on April 20, 1972

attest: Ralph E. Tidrick
Secretary

Port of Willapa Harbor

This action authorized at an
official meeting of the Port
Commissioners

By: H. J. Dunsmaier
President

on 5/9/72

Date 5/9/72

attest: J. L. Bean
Manager

Wahkiakum County Commissioners

This action authorized at an
official meeting of the Board
of County Commissioners

By: Leon L. Almer
Commissioner

on May 15 1972

Date MAY - 15 - 1972

attest: Mary A. Faymonville
County Clerk

Wahkiakum Port District #1

This action authorized at an
official meeting of the Port
Commissioners

By: Ted A. Barr
President

on May 10th, 1972

Date May 10th, 1972

attest: Robert A. Buean
Manager
Secretary

Wahkiakum Port District #2

This action authorized at an
official meeting of the Port
Commissioners

By: J. T. Oman
President

on April 26, 1972

Date May 9 - 1972

attest: Carlton E. Appelo
Manager - Secretary

Wahkiakum Soil and Water
Conservation District

This action authorized at an
official meeting of the
District Supervisors

By: Ruben E. Tappa
Chairman

on 5-22-72

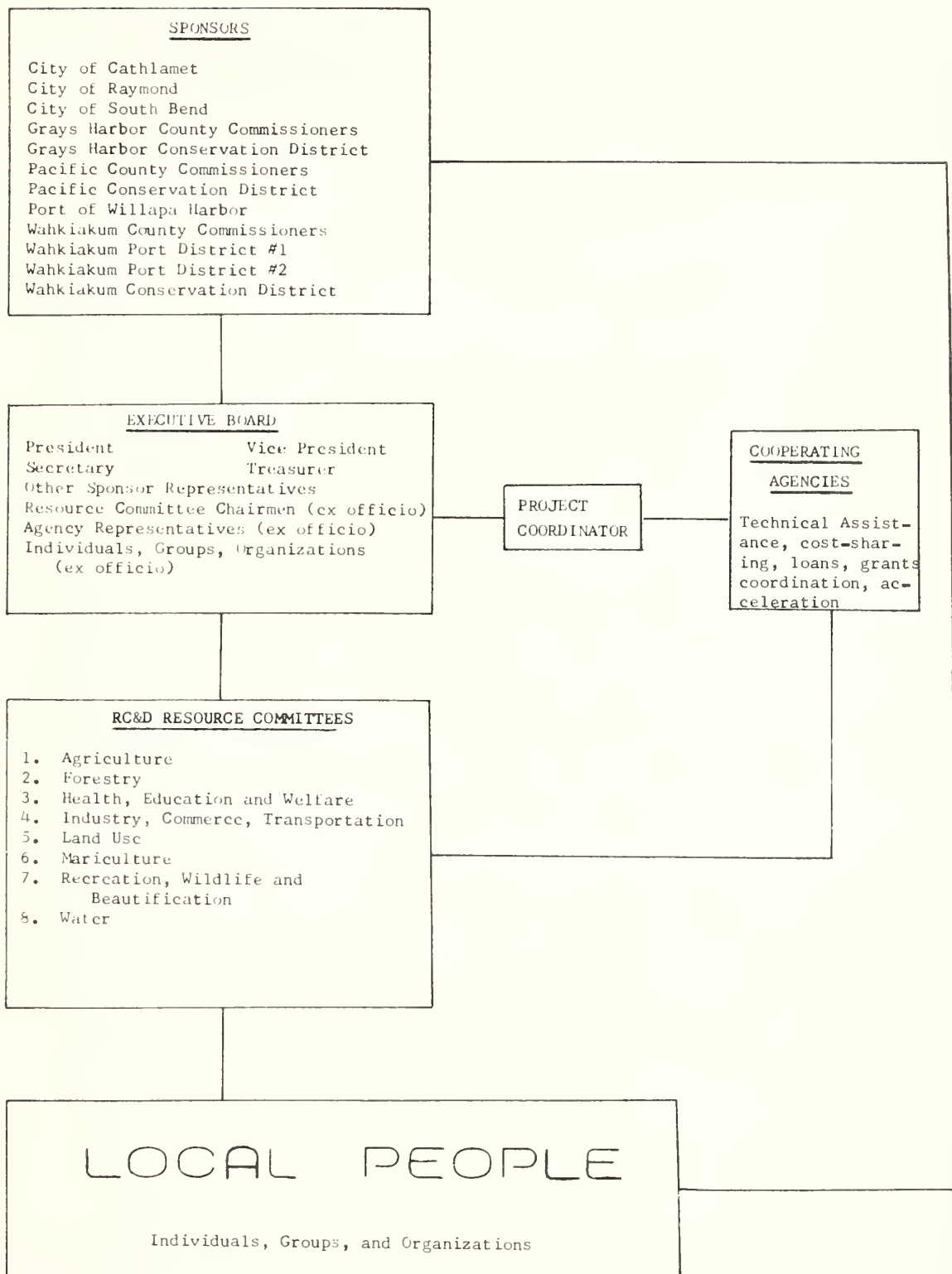
5/23/72
Date

attest: Tom W. Cwing
Secretary

The program conducted will be in compliance with all requirements respecting non-discrimination and contained in the Civil Rights Act of 1964 and the regulations of the Secretary of Agriculture (7 C.F.R. Sec. 15.1-15.13), which provide that no person in the United States shall, on the ground of race, color, religion, sex or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any activity receiving federal financial assistance.

ORGANIZATIONAL CHART

COLUMBIA-PACIFIC RC&D PROJECT



ACKNOWLEDGEMENTS

The sponsors of the Columbia-Pacific Resource Conservation and Development Project gratefully acknowledge the assistance provided by the following individuals, agencies and organizations who participated in the development of the resource action program:

Local:

Al's Quick Print
Boise Cascade
China Clipper Restaurant
Chinook Observer-Long Beach
City of Montesano
County Rural Development Committees
Cowlitz-Wahkiakum Regional Planning Commission
Crown Zellerbach
Daily News-Longview
Daily World-Aberdeen
Grays Harbor-Pacific Health District
Grays Harbor Regional Planning Commission
Harbor Pilot-South Bend Journal
Individuals serving on Resource Committees
Industrial Forestry Association
ITT Rayonier, Inc.
KAPA Radio-Raymond
Keep Washington Green Association
KTNT TV-Seattle
KXRO Radio-Aberdeen
Long Beach Cranberry Club
Long Beach School
Maretta Johnston-cover symbol
Naselle High School
National Bank of Commerce-Aberdeen
Ocean Spray, Inc.
Pacific County Historical Society
Pacific County Regional Planning Commission
Peninsula Fun Calendar
Port of Grays Harbor
PRIDE of Long Beach
Raymond Herald
Red Cedar Shingle and Handsplit Shake Bureau
Simpson Timber Company
South Bend Chamber of Commerce
State and Local Granges
The Chronicle-Elma
The Tribune-Ilwaco
University of Washington, College of Forest Resources
Vidette-Montesano
Wahkiakum County Eagle

Washington Farm Forestry Association
Washington Forest Protective Association
Weyerhaeuser Company
Willapa Harbor Citizens for Improved Health Care

State

Cooperative Extension Service
Department of Commerce and Economic Development
Department of Ecology
Department of Fisheries
Department of Game
Department of Highways
Department of Natural Resources
Department of Social and Health Services
Employment Security Department
Inter-Agency Committee for Outdoor Recreation
Office of Economic Opportunity
Planning and Community Affairs Agency
Soil and Water Conservation Committee

Federal

Agricultural Research Service - United States Department of Agriculture
Agricultural Stabilization and Conservation Service - United States
Department of Agriculture
Bureau of Indian Affairs - United States Department of Interior
Bureau of Sports Fisheries and Wildlife - Fish and Wildlife Service -
United States Department of Interior
Corps of Engineers - Department of the Army
Economic Research Service - United States Department of Agriculture
Farmers Home Administration - United States Department of Agriculture
Forest Service - United States Department of Agriculture
National Oceanic and Atmospheric Administration - Weather Service -
United States Department of Commerce
National Park Service
Pacific Northwest River Basins Committee
Soil Conservation Service - United States Department of Agriculture

Note: With a program of this scope it is impossible to give proper credit to all the individuals or agencies that have assisted us in some way.



PART ONE

DESCRIPTION OF PROJECT AREA

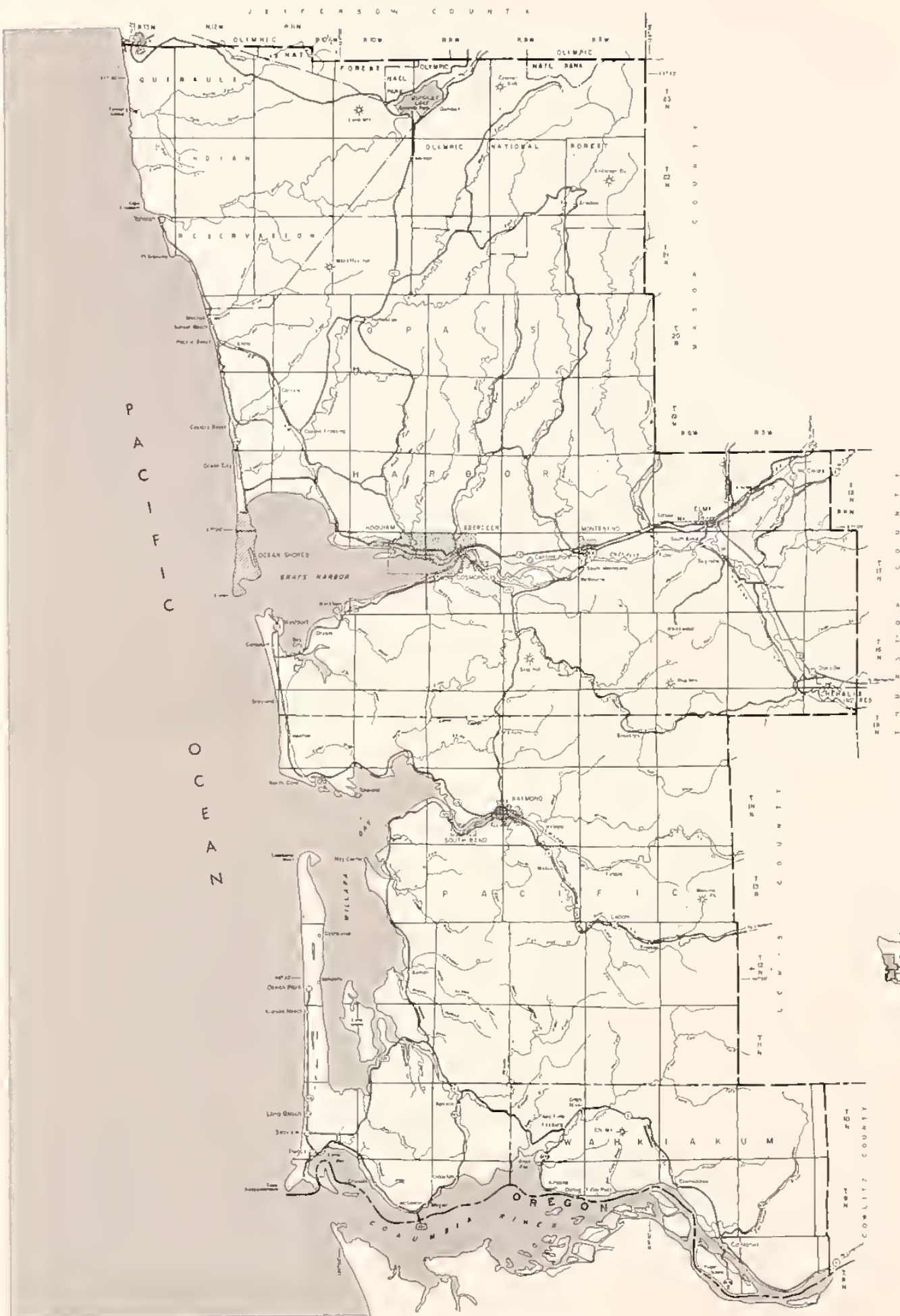
Thousands of tourists are attracted to local beaches.

WAYNE O'NEIL PHOTO



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BASE MAP
 COLUMBIA - PACIFIC
 RESOURCE CONSERVATION & DEVELOPMENT PROJECT
 GRAYS HARBOR, PACIFIC AND WAHKIACUM COUNTIES, WASHINGTON
 JANUARY 1972
 SCALE 1:800,000

M7-S-21986-N

SOIL CONSERVATION SERVICE



SIZE

The project area encompasses all of state planning district no. 2 which consists of Grays Harbor and Pacific Counties. It also includes Wahkiakum County which is part of state planning district no. 6. This variance was approved by the state because the RC&D application was submitted prior to the establishment of state planning districts.

"There are about 1,910 square miles in Grays Harbor County, 908 square miles in Pacific County and 261 square miles in Wahkiakum County. The project total is 3,079 square miles." 1/

CITIES

"There are nine incorporated cities in Grays Harbor County: Aberdeen with a population of 18,489; Hoquiam with 10,466; Montesano, the county seat with 2,847; Elma with 2,227; Cosmopolis with 1,599; Westport with 1,364; McCleary with 1,265; newly incorporated Ocean Shores with 768; and Oakville with 460.

There are four incorporated cities in Pacific County: Raymond with 3,126 people; South Bend, the county seat with 1,795; Long Beach with 968; and Ilwaco with 506.

There is one incorporated city in Wahkiakum County: the county seat of Cathlamet with a population of 647." 1/

POPULATION

"Grays Harbor County has a population of 39,485 incorporated and 20,068 un-incorporated for a total of 59,553 people.

Pacific County has a population of 6,395 incorporated and 9,401 un-incorporated for a total of 15,796 people.

Wahkiakum County has an un-incorporated population of 2,945 or a total of 3,592 people.

The population of our RC&D project area is 46,677 incorporated (59%) and 32,264 un-incorporated (41%) for a total of 78,941." 1/

POPULATION GROWTH

Grays Harbor, Pacific, and Wahkiakum Counties rank 12th, 27th, and 38th in population out of the 39 counties in the State of Washington.

1/ United States Department of Commerce, Bureau of the Census, 1970

Resident population of the project area is 78,900 as compared to 72,600 in 1960. This is a growth rate over the past 10 years of 8.7 percent as compared to 19.5 percent for the state as a whole. Most of the increase has occurred in the last 10 years as the area had experienced negative growth between 1940 and 1960.

Major growth over the past few years has been in the Cosmopolis, Montesano, Elma, McCleary, Ocean Shores, and Westport areas in Grays Harbor County. In Pacific County, most of the growth has occurred on the Long Beach Peninsula, and in South Bend. Cathlamet has shown moderate growth over the last 10 years.

FUTURE GROWTH

Future growth is expected to be high in the Ocean Shores, Long Beach and Westport areas. This growth will be due to the excellent qualities the areas possess for vacation and retirement living.

TABLE 1. POPULATION OF RC&D AREA COMPARED TO STATE OF WASHINGTON,

	<u>BY TIME FRAMES</u> <u>a/</u>				
	(figures rounded to nearest whole number)				
County	1940	1950	1960	1970	% Change 1940-1970
Grays Harbor	53,200	53,600	54,500	59,500	+11.80
Pacific	16,000	16,600	14,700	15,800	- 1.25
Wahkiakum	4,300	3,800	3,400	3,600	-16.30
Total	73,500	74,000	72,600	78,900	+ 7.35
State of Washington	1,736,000	2,379,000	2,853,000	3,409,000	+96.40

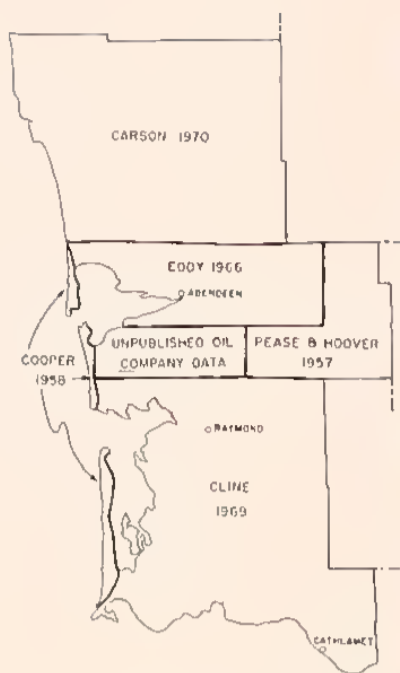
^{a/} Census Population, Bureau of the Census, Department of Commerce

^{b/} See Water Tables in Appendix for Population Projections

GEOLOGY ^{1/}

The oldest rocks found in the study area are of Tertiary age. The following discussion will cover only the sequence of geologic events of the Tertiary through Quaternary Periods (see Table A) .

^{1/} Paul A. Eddy, Geologist, State Department of Ecology, Olympia, Wash.



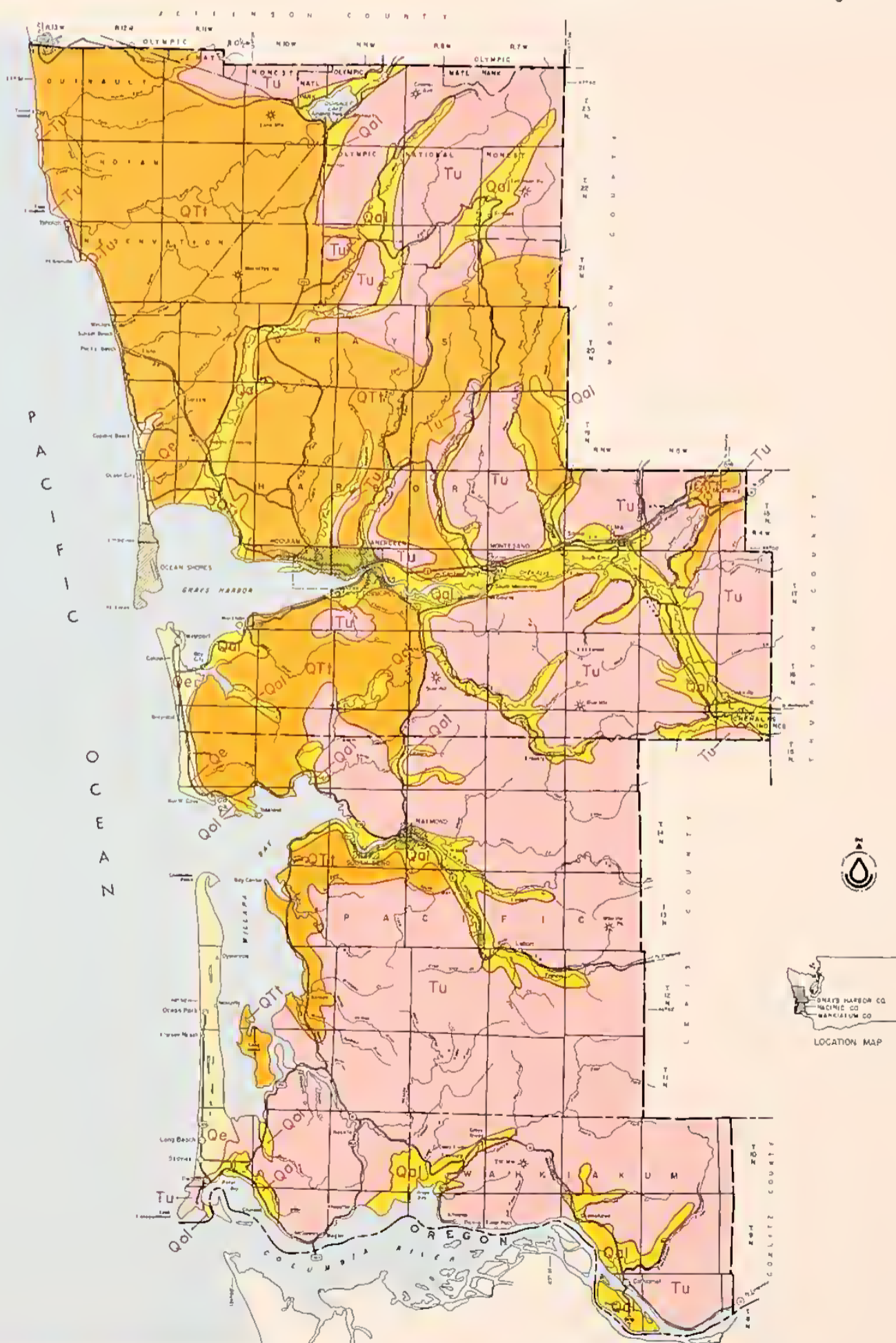
GROUNDWATER INDEX MAP

LEGEND

- Qal** Alluvium found beneath and adjacent to streams and rivers consists of sand, gravel, silt, swamp and marsh deposits. The sand and gravel units where saturated, yield large quantities of good quality water to wells.
- Qe** Along the coast, beaches, dunes and spits are composed of beach sand with lesser amounts of gravel, silt, and peat. Wells tapping the beach sand are generally shallow, small diameter sand points which produce household water. However, larger wells which penetrate in excess of 60' in the Westport area produce large quantities of water.
- QTI** Terrace deposits of unconsolidated to semiconsolidated river and glacial outwash consisting of fine-grained sand with lesser amounts of silt and clay. Shallow wells seem to produce low quality ground water whereas deep wells yield water of satisfactory quality and quantity for household and irrigation uses.
- Tu** Sedimentary and Igneous rocks composed of shales, sandstones, conglomerates, volcanic flows and cemented rock fragments. This unit is generally low in porosity and permeability and yields little water to wells.

Inferred Geologic Contact

(Geology Map Modified from Huntting and Others, 1961)



GENERALIZED GEOLOGY AND GROUNDWATER POTENTIAL
COLUMBIA-PACIFIC
RESOURCE CONSERVATION & DEVELOPMENT PROJECT
GRAYS HARBOR, PACIFIC AND WAHKIAKUM COUNTIES, WASHINGTON

DECEMBER 1971
SCALE 1:500,000

Tertiary Period

During early and middle Eocene time large quantities of basalt and basaltic sediments (Tu) were deposited across a broad, northwest-southeast trending piedmont plain that occupied most of what is now western and southwestern Washington (see map following page 19). A fluctuating sea level and shoreline at that time caused portions of the plain to lie alternately above and below sea level, resulting in deposition of some of the lavas in marine waters. Stream sediments derived from the volcanic rocks and from adjacent highlands were also deposited across the area, some forming interbeds between lava flows. By late Eocene time the volcanic activity had decreased considerably and a period of quiescence followed. During this time and extending through the Oligocene and early Miocene Epochs thousands of feet of marine sedimentary rocks (Tu) accumulated on top of the volcanic rocks.

During late Miocene time the volcanic and sedimentary formations were deformed into large northwest-southeast trending anticlinal and synclinal folds, producing the ancestral Cascade and Olympic Mountains. Erosion during early to middle Pliocene time reduced these mountains considerably. At the close of the Tertiary Period, during the late Pliocene Epoch, a north-south uplift produced the present Cascade and Olympic Mountains, with an accompanying downwarp between, forming the present Puget Trough (Weaver 1916). These uplifts declined in elevation southward and in the report area the Chehalis River, as an antecedent stream, was able to maintain its ancestral course to the Pacific Ocean through a gap of lower elevations between the Olympic Mountains and Willapa Hills.

During the late Pliocene and early Pleistocene Epochs what is now the lowlands bordering Grays Harbor was the site of deposition of sedimentary materials. These sediments consist principally of stream-laid gravel and coarse sand derived from the Olympic Mountains, and to a lesser extent, from the Willapa Hills. Finer sediments and organic materials accumulated locally in shallow lakes and swamps, resulting in lenses of peat and wood fragments within the coarser detritus.

Quaternary Period

Pleistocene Epoch

During the Pleistocene "Ice Age" large valley glaciers developed in the Olympic Mountains and vast ice sheets originating in the mountains of British Columbia pushed southward into the Puget Sound lowlands. A fluctuating climate caused these glaciers to alternately grow and advance, and melt and "retreat" several times during the Pleistocene Epoch. The last ice disappeared from the Puget lowland approximately 14,000 years ago and a corresponding decline reduced the size of the Olympic valley glaciers.

During the periods of glacial activity, large streams issued from the fronts of the ice and carried great loads of sand and gravel across the countryside and down the valleys. Material from the Olympic Mountain glaciers was deposited in great thicknesses in the foothill valleys and in the Chehalis valley to the south. Derived from Olympic Mountain rocks, these sediments are composed chiefly of coarse basaltic sand and gravel (Qal), with minor quantities of sandstone and shale pebbles. In the eastern part of the study area, glacial outwash from the Puget lobe was carried into the Chehalis drainage by several streams that "spilled" through low gaps in the Black Hills and around the north and south flanks of these hills. The major channels carrying the outwash during this time were, from north to south, the Satsop, Cloquallum, Mox Chehalis and Black River valleys. In contrast to the chiefly basaltic rocks derived entirely from the Olympic Mountains, the sediments from the Puget lobe glaciers are composed not only of rocks from the southeastern part of the Olympics, but include granitic pebbles and rocks derived from the northern Cascade Range and mountains of British Columbia.

Holocene (Recent) Epoch

The thick gravel and sand deposits that filled tributary valleys in late Pleistocene time were deeply incised by Recent streams, leaving gravel terraces (QTt) as remnants of the more extensive valley deposits. The reworked materials were carried to the Chehalis valley to become incorporated with the larger stream's sediments and to be deposited as alluvium (Qal). The Chehalis and Hoquiam River sediments partially filled the marine embayment at their mouths while longshore ocean currents produced the long sand spits (Qe) that today nearly enclose the western entrances to Grays Harbor and Willapa Harbor. These processes of erosion and deposition continue through the present day. Peat deposits continue to accumulate in oxbow lakes and marshy areas in major river valleys and small landslides occur locally near the base of steeper hillsides undercut by streams.

SOILS

The general soil map following page 23 shows the soil associations in the project area. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and several minor soils, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in an area, who want to compare different parts of an area, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning and management of

a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The following soil associations are in the project area:

1. ROUGH MOUNTAINOUS LAND ASSOCIATION (91 percent of RC&D area) consists mainly of deep, very steep, medium textured soils on mountainous terrain. Rough mountainous land makes up about 60 percent of the association, Garrard, Hoquiam, and Lytell soils on terraces each make up about 3 percent, and the remaining 31 percent consists of small amounts of many kinds of soils. Fine textured Garrard soils occupy the crests and moderately fine textured Lytell soils occupy the very steep sideslopes of uplands of sedimentary origin. Moderately fine textured Hoquiam soils occupy nearly level to very steep upland terraces of old alluvium origin.

Most of the association is covered with highly productive coniferous forests. The principal uses are woodland, wildlife habitat, recreation, and watershed.

Soils of sedimentary origin are unstable and subject to slips and slides when undercut.

2. GREHALEM-CHEHALIS ASSOCIATION (3 percent of RC&D area) consists of very deep, nearly level, well drained, medium and moderately fine textured soils on flood plains. Grehalem soils make up about 27 percent of the association, Chehalis soils about 19 percent, and Cloquato soils about 9 percent. Fine textured, poorly drained Rennie soils and very poorly drained Salzer soils make up about 29 percent. The remaining 16 percent consists of small amounts of medium textured soils, Alluvial land, and gravel bars. Grehalem and Chehalis soils are moderately fine textured. Grehalem soils occur in the coastal area of 70 to 160 inch rainfall. Chehalis soils occur in the dryer part of Chehalis valley having a 50 to 60 inch rainfall.

These soils are the most productive in the RC&D area. They are used for intensive cropping, improved pasture, silage, and hay. Row crops are grown only on the Chehalis and Cloquato soils.

These soils are subject to repeating winter and spring overflow and floods.

3. DUNE LAND - YAQUINA ASSOCIATION (2 percent of RC&D area) consists mainly of undulating coastal dunes and nearly level, poorly drained, coarse textured and organic soils. Dune land makes up about 26 percent of the association, Yaquina soils about 23 percent, and Netarts soils about 21 percent. The remaining 30 percent consists mostly of very poorly drained Orcas, Seattle and Shalcar organic soils. Dune land and Netarts soils are rapidly permeable and excessively drained. Dune land has a sparse sawgrass vegetative

cover. Netarts soils support dense stands of spruce, hemlock, and lodgepole pine. Yaquina soils are nearly level, rapidly permeable, poorly drained, and have a thick vegetative cover of brush, spruce, and deciduous trees.

Most of the organic soils are used for growing cranberries. Dune lands are used for recreation and wildlife habitat. Netarts soils are primarily used for summer and year-around vacation cottages, recreation, and wildlife habitat.

Dune land and Netarts soils are subject to severe wind erosion losses when the surface is exposed.

4. OCOSTA ASSOCIATION (2 percent of RC&D area) consists mostly of level, poorly drained, fine textured soils of the diked and undiked tidelands at the mouths of larger streams. Ocosta soils make up about 67 percent of the association and the remaining 33 percent consists mostly of tidal marsh and tidal swamps. Marshes have a forest vegetative cover and swamps have a grass-sedge vegetative cover. The watertable is at the surface most of the time.

Diked Ocosta soils are used mostly for growing forage crops and as pastureland.

Diked areas of this association have a continuous water table at about a two foot depth. Undiked areas are covered with water daily by high tides.

5. SPANAWAY ASSOCIATION (1 percent of RC&D area) consists mainly of nearly level and undulating excessively drained, coarse textured, gravelly soils on low terraces. Spanaway soils make up about 39 percent of the association, Sol Duc soils about 25 percent, and Sifton and Klone soils each make up about 11 percent. The remaining 14 percent consists of Bear Prairie soils, which are nearly level to gently undulating, well drained, and medium textured.

The Spanaway and Sifton soils located in the Chehalis and Humptulips River valleys are used for pasture. Spanaway and Sifton soils have thick black surface layers and are underlain by very gravelly sand. Some Spanaway and Sifton soils are irrigated for forage crop production. The Klone and Sol Duc soils are used primarily for growing timber. Sol Duc and Klone have thick brown surface layers and are underlain by very gravelly sand. Bear Prairie soils between Montesano and Elma are used for forage crops, grain, and pasture.

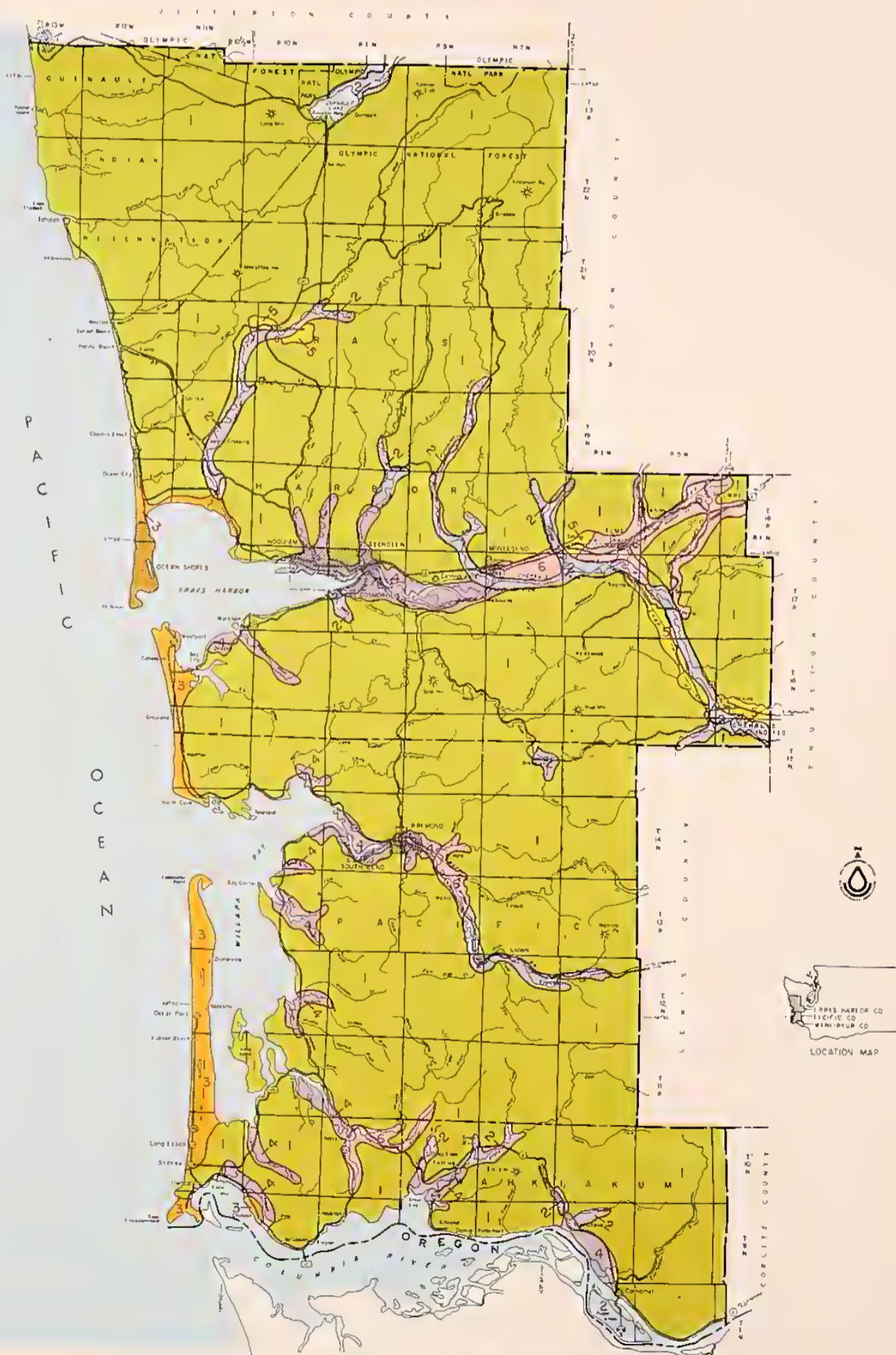
6. GINGER ASSOCIATION (1 percent of RC&D area) consists of nearly level somewhat poorly drained and poorly drained fine textured soils on low terraces occupying parts of major river valleys. Ginger soils make up about 35 percent of the association, Alluvial land, loamy about 20 percent, and Dabob soils about 15 percent. The remaining 30 percent consists mostly of poorly drained soils in depressions.

SOIL ASSOCIATION LEGEND

- 1 ROUGH MOUNTAINOUS LAND ASSOCIATION: 91 percent of RC&D area. Deep, very steep, medium textured soils on mountainous terrain.
- 2 GREHALEM-CHEHALIS ASSOCIATION: 3 percent of RC&D area. Very deep, nearly level, well drained, medium and moderately fine textured soils on flood plains.
- 3 DUNE LAND-YAQUINA ASSOCIATION: 2 percent of RC&D area. Undulating coastal dunes and nearly level poorly drained coarse textured and organic soils.
- 4 OCOSTA ASSOCIATION: 2 percent of RC&D area. Level, poorly drained, fine textured soils of the tidelands.
- 5 SPANAWAY ASSOCIATION: 1 percent of RC&D area. Nearly level to undulating, excessively drained, gravelly coarse textured soils on low terraces.
- 6 GINGER ASSOCIATION: 1 percent of RC&D area. Nearly level, somewhat poorly drained and poorly drained, fine textured soils on low terraces.

Map developed in part from detailed soil surveys, in part from reconnaissance soil surveys, and in part by interpretations.

This map is intended for general planning. Each delineation may contain soils different from those shown on the map. Use detailed soil maps for operational planning, and on-site inspection for more detailed decisions.



GENERAL SOIL MAP
COLUMBIA - PACIFIC
RESOURCE CONSERVATION & DEVELOPMENT PROJECT
GRAYS HARBOR, PACIFIC AND WAHIAKUM COUNTIES, WASHINGTON

JUNE 1972
SCALE 1:150,000

Ginger soils are somewhat poorly drained and fine textured. They occupy areas in the Willapa and Naselle valleys and in the Chehalis valley at Montesano. Alluvial land, loamy is nearly level, is stratified with sand, silts, and clays in the subsoil, and is poorly drained. It occurs in the Chehalis valley between Montesano and Elma. Dabob soils are very gravelly, moderately well drained, and occupy nearly level valley floors in the McCleary and Mox Chehalis valley area.

The soils in this association are used mostly for forage crops, pasture, and grain. These soils have a water table at or near the surface during the rainy season.

CLIMATE 1 /

The climate of the beach area along the Washington coast is a mid-latitude west coast, marine-type. The summers are cool and comparatively dry, and the winters are mild, wet, and cloudy. The air is moist and the daily and annual range in temperature is small. Some of the factors influencing the climate are: the prevailing direction of the wind, surface temperature of the ocean, the Coastal and Cascade Mountains, and the position and intensity of the large high and low pressure centers over the north Pacific Ocean. The ocean current near the coast reverses direction between summer and winter: in summer, the California current is moving south and in the winter, the Davidson inshore current is moving north. The temperature of the water along the coast ranges from 48° in February and March to 58° in August. (see growing season maps pages 27 and 28)

During the spring and summer, a clockwise circulation of air around the large high pressure area, which covers most of the eastern north Pacific, brings a prevailing flow of air from a northwesterly direction into Washington. The average temperature of the air over the ocean in mid-summer ranges from 55° to 60°. As the air moves inland, it becomes warmer and drier. This circulation results in a dry season beginning in the late spring and reaching a peak in mid-summer. During July and August, it is not unusual for two to four weeks to pass with only a few light rain showers. At this season of the year, the wind is comparatively light ranging from a gentle to a fresh ocean breeze. In the latter half of the summer and fall, fog banks frequently form off shore moving inland at night, and clearing along the beaches by the following noon.

In mid-summer, the average afternoon temperatures range from 65° to 68° and the nighttime temperatures are near 50°. A few miles inland, afternoon temperatures are in the 70's. Occasionally, hot dry easterly winds crossing the Cascade Mountains reach the coast. The hottest weather occurs under these conditions and maximum temperatures may reach 90° or higher, while the relative humidity drops to 30%. High temperatures

1 / Earl L. Phillips, State Climatologist, United States Weather Bureau

seldom continue more than one to three days before cooler moist air from over the ocean moves inland. During periods of dry easterly winds, forest fires are started easily and spread rapidly.

In the fall and winter, the low pressure center near the Aleutian Islands intensifies and spreads southward. At the same time, the high pressure center becomes smaller and also moves south. This results in a prevailing flow of warm moist air from a southwesterly direction. Weather disturbances crossing the north Pacific follow a more southerly course during the winter, which results in an increased number of storms striking the Washington coast. Wind velocities ranging from 50 to 70 MPH occur almost every winter as the more intense storms move inland. The highest wind velocity ever recorded at North Head is 113 MPH. On one of the higher and well exposed peaks in the Willapa Hills, elevation 2,000 feet, wind velocities in excess of 100 MPH have occurred several times in the last five years.

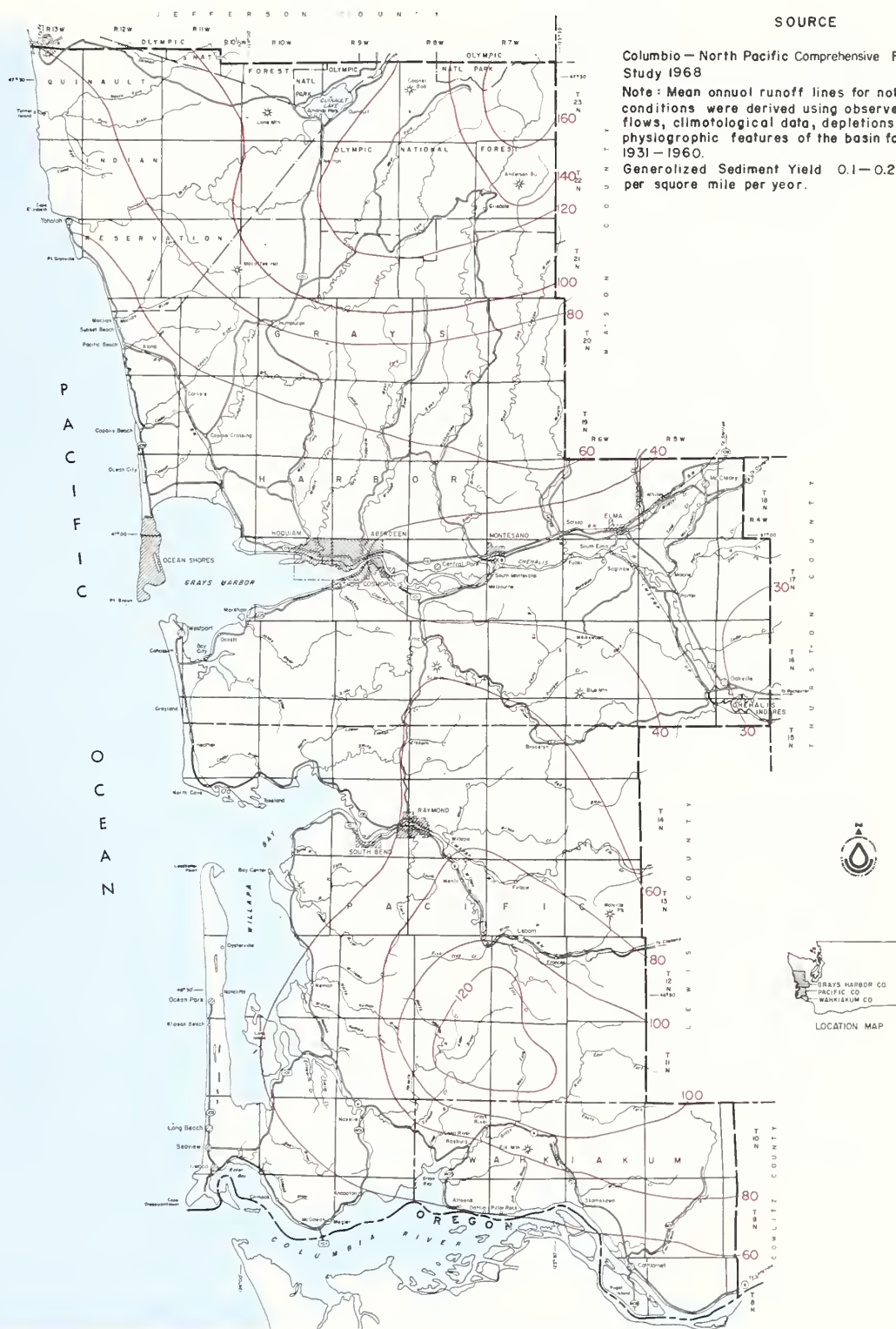
In the spring, the ocean gradually becomes more calm as the frequency of storms over the north Pacific decreases and the high pressure area spreads northward. The prevailing direction of the wind gradually shifts from southwest in the winter to west in the spring; northwest by early summer; and back to west in the early fall.

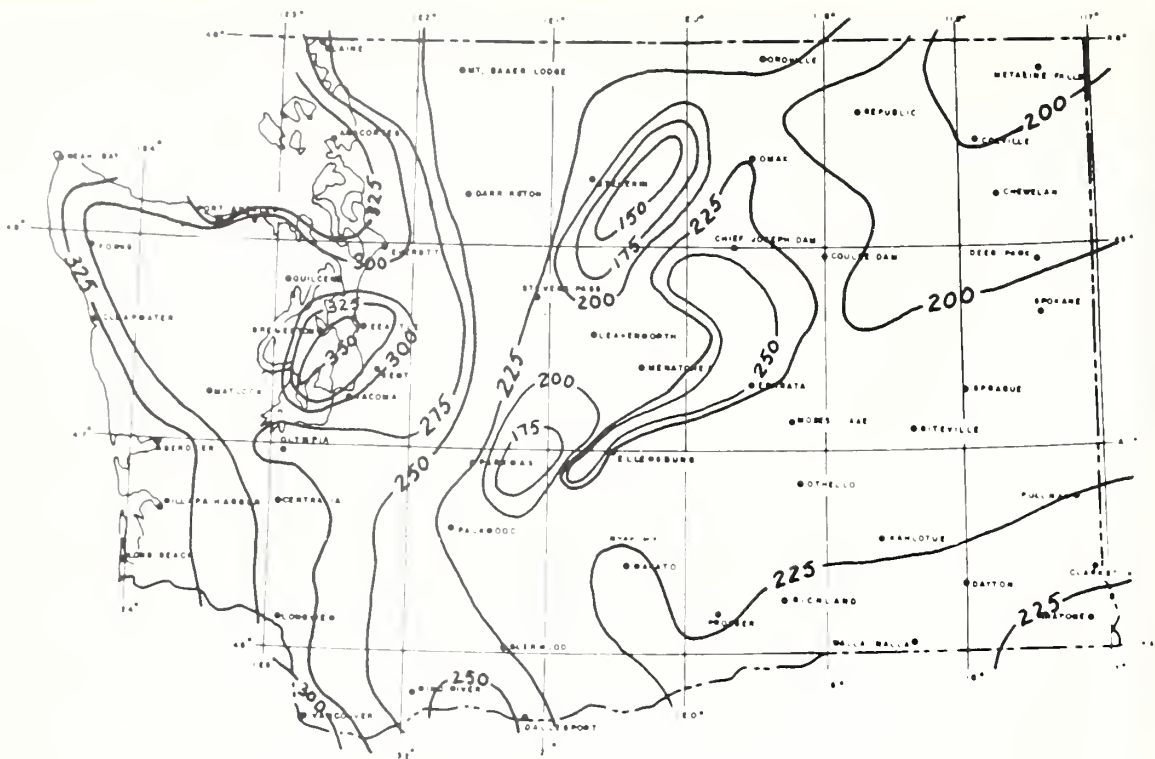
The rainy season begins in the fall, reaches a peak in the winter, then decreases in the spring. Along the entire coast, variations of five to 20 inches in the annual precipitation occur within short distances. In general, the annual precipitation ranges from 65 to 75 inches in beach areas located some distance from the hills. Near the foothills, annual precipitation amounts range from 80 to 90 inches, increasing to 100 inches in the Willapa Hills and 125 to 150 inches or more in the "rain-forest" along the windward slopes of the Olympic Mountains. (see precipitation map following page 29)

Snowfall is light in the beach areas and frequently melts as it falls. Inland, snowfall increases in the foothills, and the higher elevations of the Olympic Mountains are covered with snow from early winter until late spring. (see snowfall map page 28)

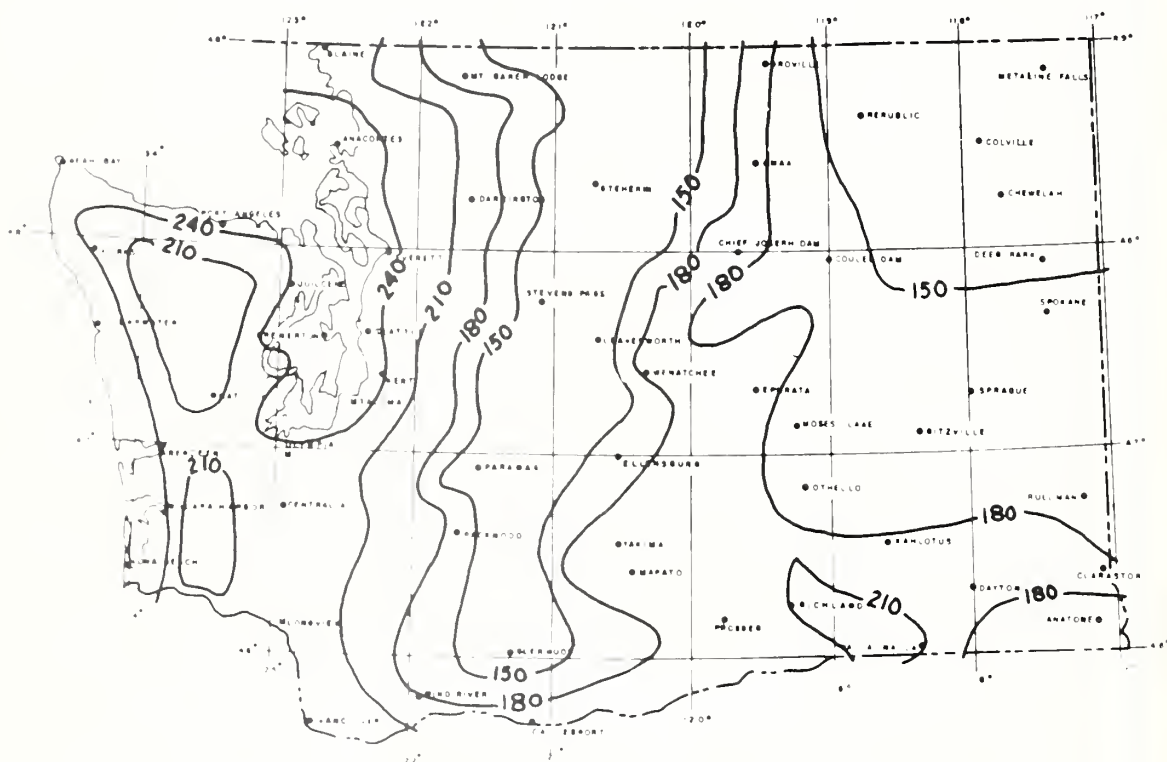
In the winter, afternoon temperatures are in the 40's and night temperatures in the upper 30's. The coldest weather usually occurs when cold dry northeasterly or easterly winds from east of the Cascade Mountains reach the coast. The sky is frequently clear under these conditions and additional heat is lost by radiation at night. Minimum temperatures may drop to 20° or lower and maximum temperatures fail to rise above the mid-30's. Cold weather seldom continues more than a few days before warmer moist air from over the ocean moves inland. In the cranberry bogs, near the ocean, the average last occurrence of 32° or a freezing temperature in the spring, is about the middle of April, and the first freeze in the fall is near the end of October. (see frost maps pages 29 and 30)

The climatic variability of the project area is shown by the following maps:



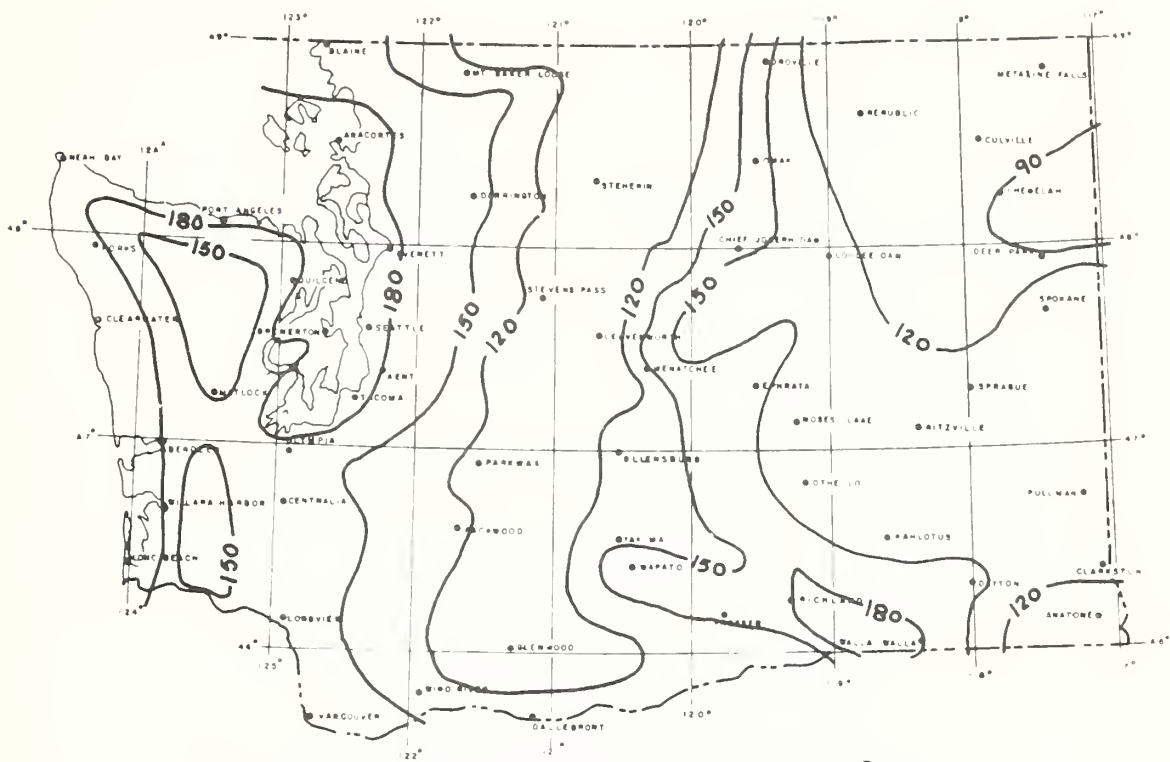


MEAN LENGTH OF GROWING SEASON, DAYS (24° F.).

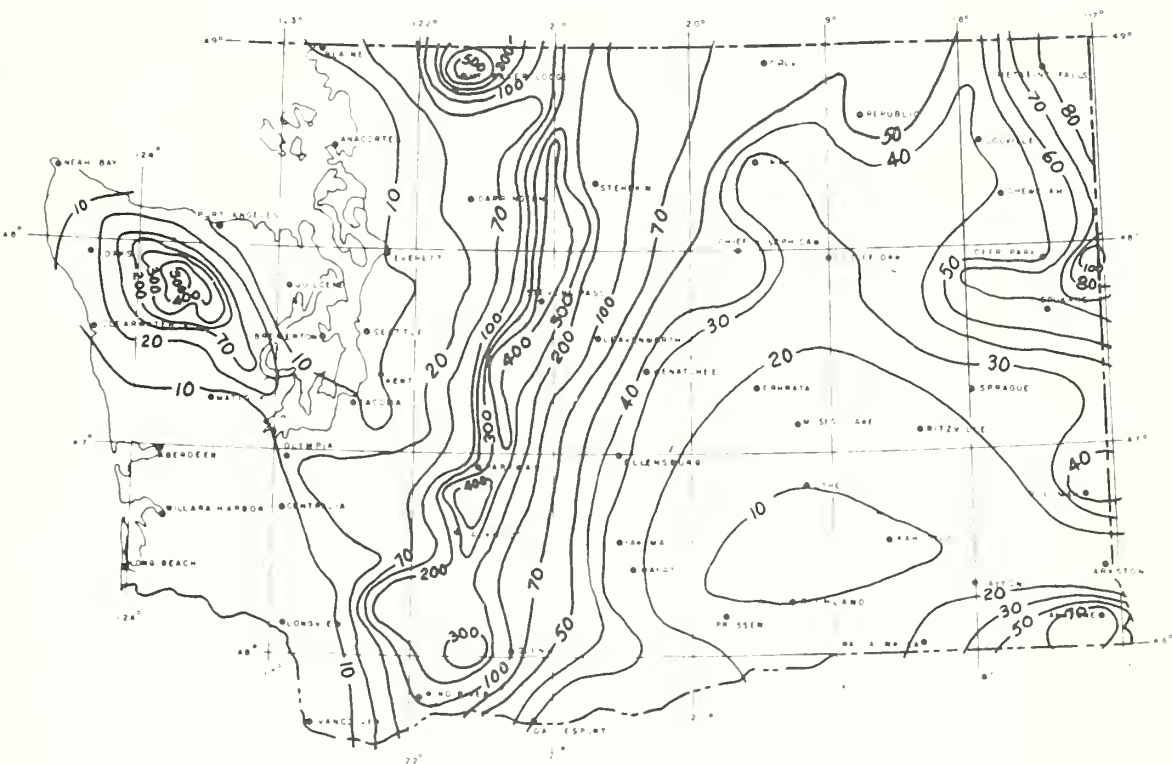


MEAN LENGTH OF GROWING SEASON, DAYS (28° F.).

These maps are intended to be used only as an indication of the general climatology of the State of Washington. Isolines are drawn through points of approximately equal value. Caution should, therefore, be used in interpolating on these maps, particularly in mountainous areas.

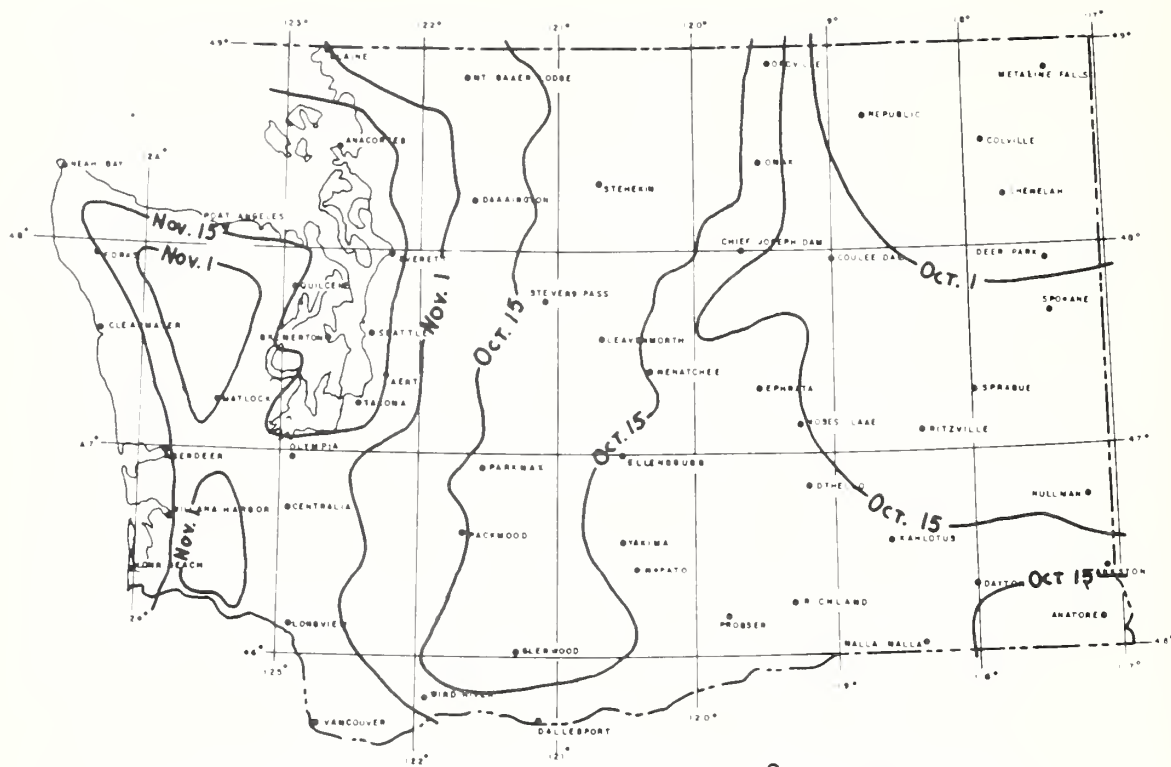


MEAN LENGTH OF GROWING SEASON, DAYS (32° F).

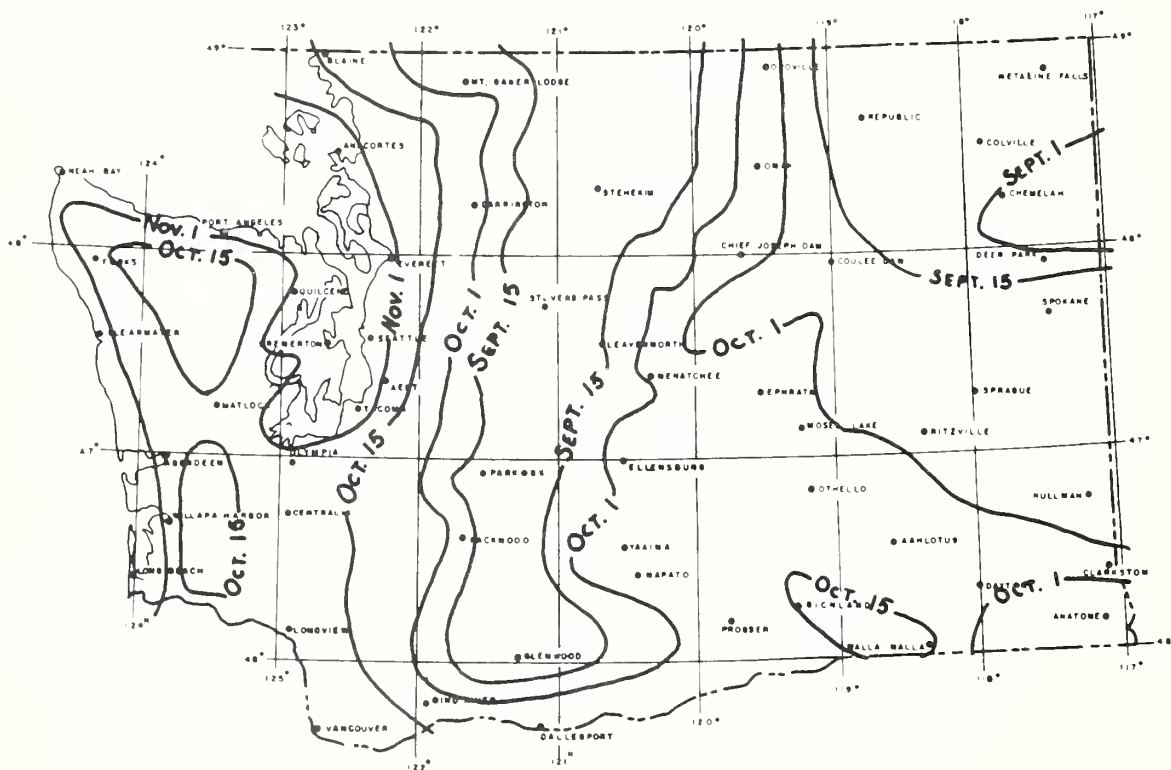


MEAN ANNUAL SNOWFALL (INCHES OF SNOW), 1951 - 1960.

These maps are intended to be used only as an indication of the general climatology of the State of Washington. Isolines are drawn through points of approximately equal value. Caution should, therefore, be used in interpolating on these maps, particularly in mountainous areas.

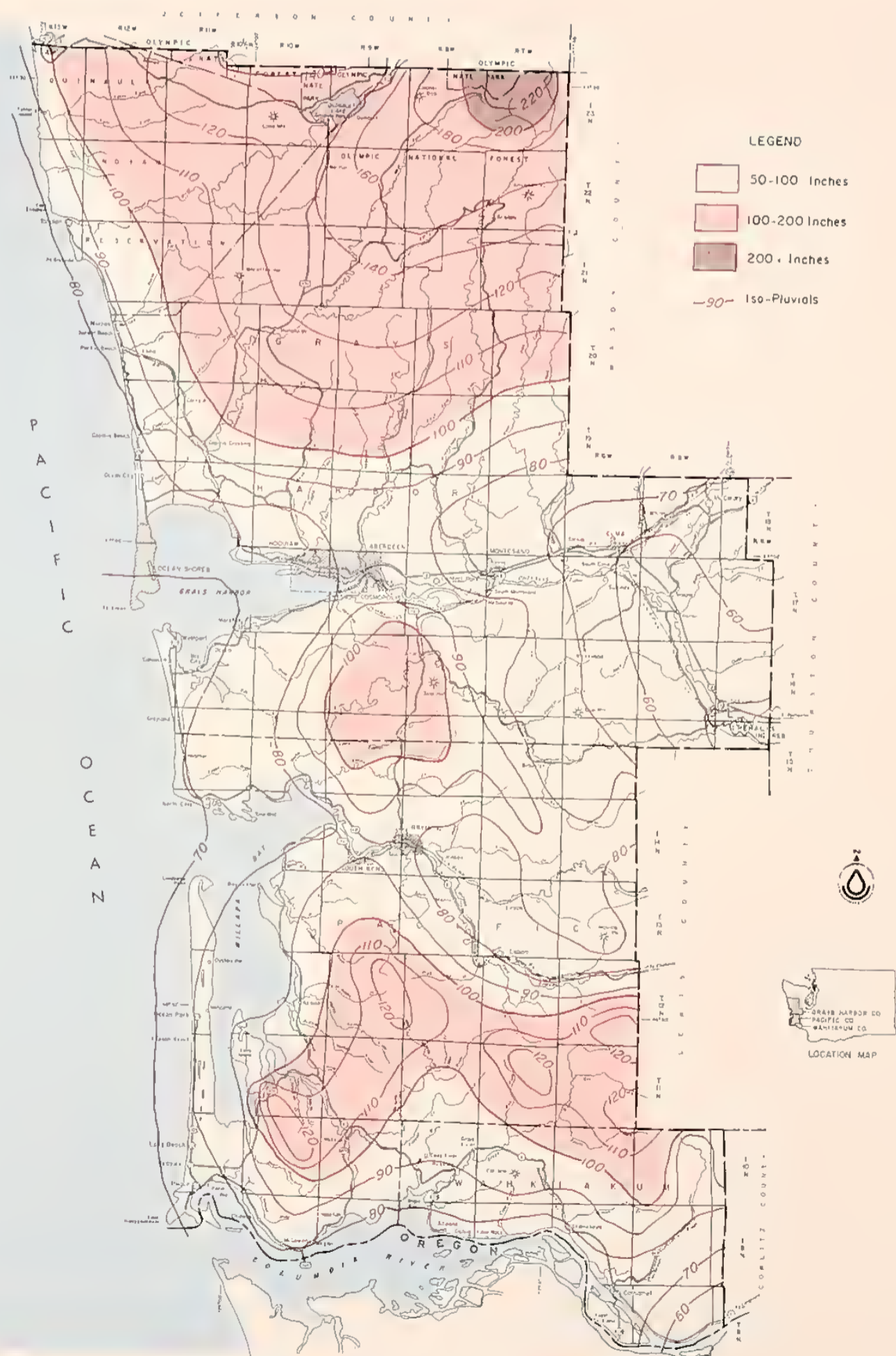


MEAN DATE OF FIRST OCCURENCE OF 28° F IN FALL

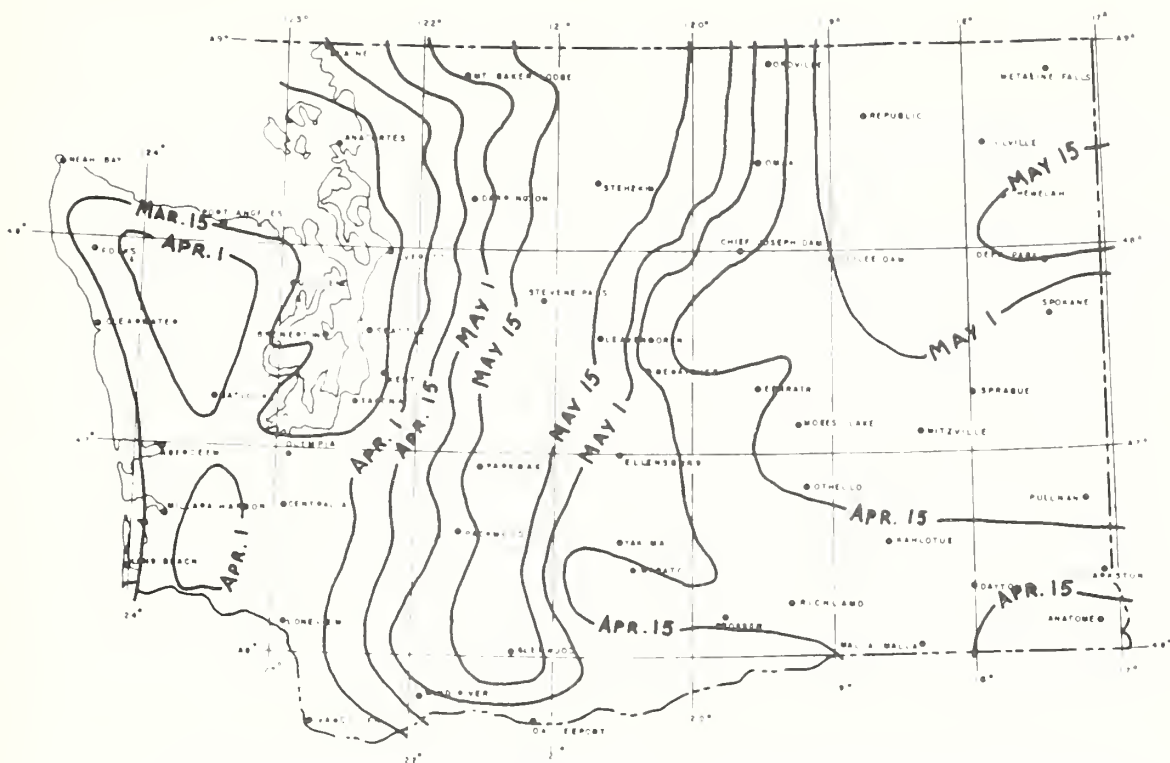


MEAN DATE OF FIRST OCCURENCE OF 32° F IN FALL

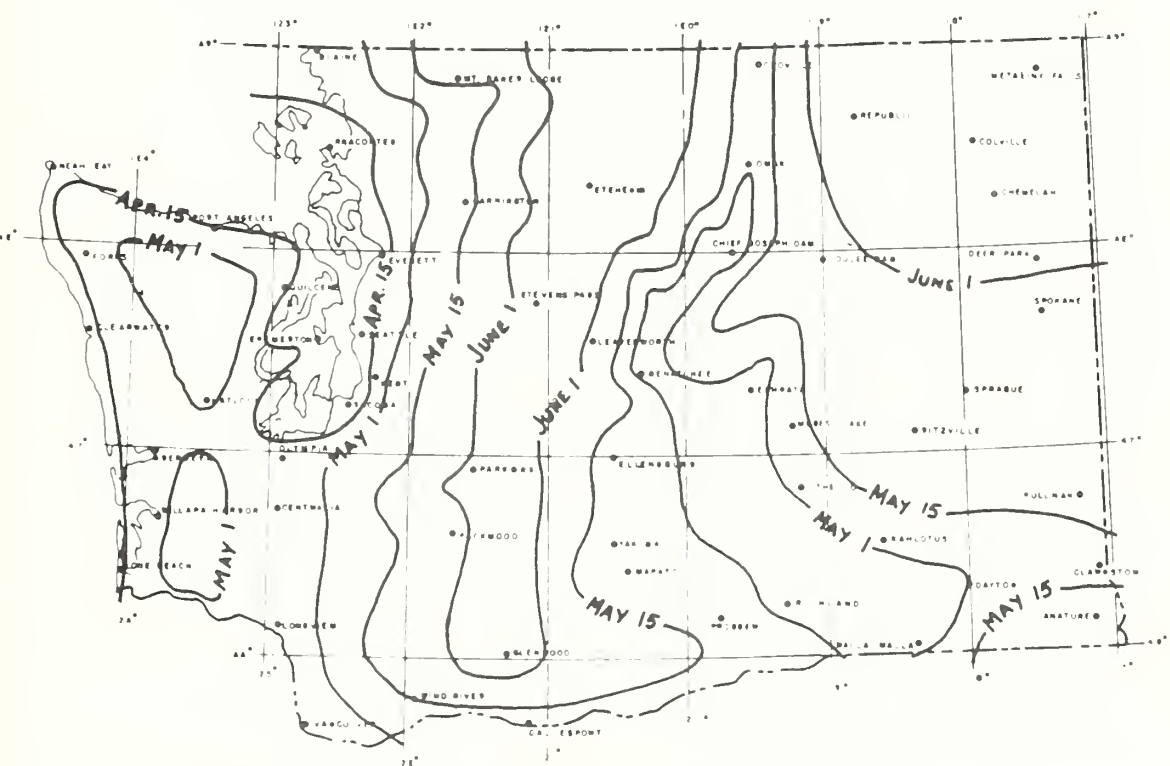
These maps are intended to be used only as an indication of the general climatology of the State of Washington. Isolines are drawn through points of approximately equal value. Caution should, therefore, be used in interpolating on these maps, particularly in mountainous areas.







MEAN DATE OF LAST OCCURRENCE OF 28° F IN SPRING



MEAN DATE OF LAST OCCURRENCE OF 32° F IN SPRING

These maps are intended to be used only as an indication of the general climatology of the State of Washington. Isolines are drawn through points of approximately equal value. Caution should, therefore, be used in interpolating on these maps, particularly in mountainous areas.

HISTORICAL AND SOCIAL BACKGROUND

Grays Harbor County 1 /

Chehalis County, now Grays Harbor County, was, until April 14, 1854, a part of Thurston County. On that date, the Territorial Legislature passed an act that created Chehalis County, acting on a bill introduced by James Byles of Montesano. The county's name, Chehalis, was Indian, after the people who inhabited the shores of Grays Harbor.

The Territorial Legislature also provided that the county seat should be located at the "house of D. K. Welden" who was named the first treasurer. His home was on Shoalwater Bay. At its formation, Chehalis County included a portion of what is now Pacific County.

The county's first officials, Welden, Watkins, Vail, Bullard, and Russell were all residents of the Shoalwater Bay country, living in a territory that was claimed by both Chehalis and Pacific Counties. They definitely became residents of Pacific County when the change in boundary came in 1873.

By legislative act on January 28, 1860, the county seat was located at "the place of J. L. Scammon (I. L. Scammon) on the south side of the Chehalis River near the present Montesano". Scammon's wife, Lorinda, who was very religious, wished the place to be called "Mount Zion". However, at a fireside council, Samuel James, Mound Prairie pioneer of 1852, suggested that "Montesano" had about the same meaning and a pleasanter sound. The suggestion won approval and shortly thereafter, a post office of that name was obtained.

A few years later, S. H. Williams, one of the party which had been shipwrecked on Queen Charlotte Island, captured and enslaved by the Haidah Indians, then subsequently ransomed and rescued by other pioneers, purchased 16 acres of Medcalf's Prairie, platted it and recorded it as Montesano.

The Scammon place and Williams' platted town were more than a mile and a half apart and separated by the Chehalis River. A townsite struggle ensued, and although the county seat remained at the Scammon place, the prairie site platted by Williams drew the population and the business. In 1886, voters of Chehalis County decided to move the county seat to the platted town, for most of the population was on the north side of the unbridged Chehalis, and water often surrounded the Scammon place during freshet time.

The first courthouse in the new location was built in 1890, and stood near the present courthouse site.

Years later something did come of the big fight. In 1915, on June 9, Chehalis County became Grays Harbor County.

1 / Adapted from: Ed VanSyckle, The Book of the Counties, Grays Harbor County, 1953.

Historically, the beginnings of the white man in Pacific County date back to the landing of Captain Robert Gray from his ship Columbia at the ancient Indian village of Chinook, May 11th, 1792.

Chinook with its 36 Indian houses of split cedar boards was tribal headquarters of the celebrated Chinook Indians then living in force in this area, and the landing of Gray, it is generally admitted, established the foundation for the claim of the United States to the region of the Pacific Northwest. The landing was on the Columbia River shoreline of Pacific County.

The news of the discovery of Gray's "Great River of the West" long the object of search by explorers of every nation, and first made known to the world in the reports of Admiral Vancouver, was of the utmost moment in the minds of the statesmen of many nations, and especially those of Great Britain and America. Thomas Jefferson had already given evidence of interest in the Pacific Northwest, and there can be no doubt the discovery of the American fur trader triggered in the mind of Jefferson a resolve to have it exploited in the interest of the United States, then in its infancy, but filled with the fire of the pioneer spirit. It doubtless became the subject of animated conversations between the great President and his secretary and relative, Merriwether Lewis.

The outcome of these conversations, and the official action that followed, was that on a November day in 1805, Captains Lewis and Clark, with their command of thirty men, accompanied by Sacajawea and her infant, made camp in the lee of Point Chinook, now called Fort Columbia, where the dug-out canoes of their expedition could be drawn up out of the rough waters of the Columbia estuary in the shallow cove formed beside the Point, and now crossed by the highway embankment. The field map drawn by Captain Clark shows the place of their encampment especially marked with a cross within a circle well back from the river bank. It was located only a mile below the landing place of Captain Gray, and within the area of what was to become Pacific County, and an early seat of justice for that county.

The tremendous success of the Lewis and Clark expedition in reaching their final objective was recorded in the field journal of Sergeant Patrick Gass, who remained in camp on November 16, 1805, while Captains Lewis and Clark were out scouting the coastline. Gass inscribed in his journal:

"We are now at the end of our voyage, which has been completely accomplished according to the intention of the expedition, the object of which was to discover a passage by the way of the Missouri and Columbia Rivers to the Pacific Ocean".

1/ Adapted from: Frank Turner, The Book of the Counties, Pacific County, 1953.

Washington historians tend to skip the story of the Lewis and Clark encampment, and the Oregon historians play up Fort Clatsop (a mere winter camp) and a small salt-boiling outpost at Seaside. One does not blame them, but skipping over the "attainment of their objective" at Point Chinook is like skipping Plymouth Rock on Cape Cod as a Pilgrim landing place.

Oystering on Shoalwater Bay, now known as Willapa Harbor, having developed as the principal cash crop of the area in late 1851, the exiled citizens of Pacific City, and others who trekked across the portages from the Columbia River, joined with sailors from San Francisco coastal vessels in oyster gathering at Bruceport and Oysterville. There is a story of the burning of the schooner Robert Bruce by a demented cook after he had administered laudanum to the sailors in their coffee in late 1851. The stranded sailors, whose lives were saved by a settler went to work at oystering in the vicinity that became known as Bruceport.

Oysterville, first settled by R. H. Espy and I. A. Clark in 1854 because of the oysters in that location, attracted men from Pacific City, and by vote of the people in May, 1855, was designated the county seat. The county seat oystering town prospered, and became the educational, cultural and religious center of the county. Public school education began about 1863. A church was built about ten years later, the lumber coming from a small mill established in South Bend. The first courthouse, owned by the county, was built about 1876.

Pacific County owes much to its intimate contact with the sea. The early sustenance of the people was from the fish and shellfish found in the waters of Willapa Bay and the Lower Columbia River. Transportation, aside from the stage lines along the ocean beach, was by boats on bay and river. By the year 1888, the demand for road and trail connections started the building of bridges across Bear River, the Naselle, Chinook and Wallicut Rivers.

By the year 1890 the economy of Pacific County was undergoing a shift from that of the seashore, bays and rivers with their tourists, oysters and fish to the established payrolls of the lumbering industry. Coastal schooners carried lumber to San Francisco, and the Northern Pacific rail lines were being extended into South Bend.

Wahkiakum County 1/

A portion of the area now known as Wahkiakum County was probably first seen by white men when Captain Robert Gray, in that memorable May of 1792, attempted to explore the river he had discovered, but had to abandon the plan because of navigation problems. He had gone fifteen or twenty miles from the bar when he struck the sand bar that caused

1/ Adapted from: Maude K. Butler, The Book of the Counties, Wahkiakum County, 1953.

him to turn back. We know definitely that Lieutenant William Broughton, sailing with Captain George Vancouver of the British navy, four months later passed Wahkiakum County on his way up river. He named the large island between Washington and Oregon in Wahkiakum County Puget Island.

On the original map made by Lewis and Clark, the Cathlamet and Wahkiakum Indian tribes were located in what is now Wahkiakum County. No one knows how long these tribes had made this their hunting ground. At Cathlamet they had one of the largest Indian villages on the Columbia. Tradition says that in late November of 1805, Lewis and Clark stopped for a short time with the Indians then ruled by Queen Sally, but refused her hospitality for an overnight stay since they were anxious to establish winter quarters. Unlike LaSalle, they left no buried plates, so there is no proof that they stopped.

The real history of Wahkiakum County began when James Birnie, his wife Charlotte, and their ten children settled at the spot we call Cathlamet in 1846. Birnie had been an employee of the Hudson's Bay Company for many years, serving them at Spokane House, Vancouver, Fort Simpson, and Fort George. It was from the latter post that he came to Cathlamet, which he called Birnie's Retreat.

Slowly new settlers drifted in, settling in the valley of the Elochoman, a small tributary of the Columbia. The Birnies and Strong's owned all the land which is now the townsite of Cathlamet, and a son-in-law of Birnie's Alex Anderson, had a donation land claim east of Birnie's in what is now Rosedale. The new settlers pushed into the back country.

Red Harrington, a Scotchman, was living at Pillar Rock in 1848. He built a salmon cannery there in the early 70's.

John Fitzpatrick, the first seiner on the Columbia and long identified with the salmon industry, came in 1867.

In 1867, William Hume arrived from California to build the first salmon cannery on the Columbia.

For eight years after Birnie's settlement his claim was under the jurisdiction of Lewis County which had been created in December, 1845. In April, 1854, the territorial legislature formed Wahkiakum County.

County assessor Stillwell took the first census in the county on January 13th, 1853, and found a total of 52 persons, all living in and about Cathlamet. Twenty of these were under 21 years of age. There were 37 males and 15 females. Eight different states were represented, as well as the countries of Great Britain and Prussia.

The early 60's also saw the beginning of logging, still the most important industry in Wahkiakum County. With the coming of logging, the farmer had a market for his few products - hay, livestock, butter and milk. The climate which made the growing of certain crops difficult was excellent for dairying. The mild winters and wet summers furnished an abundance of feed for the cows.

Improved methods of logging and fishing brought new people into the areas not yet settled and the county grew rapidly in the late 80's and 90's.

The steamboats running between Astoria and Portland gave the settlers along the Columbia from Eagle Cliff to Pillar Rock excellent freight and passenger service but for those living in the west end of the county in the valleys of Crooked Creek, Grays River, and Deep River, it was a different story. They were almost completely isolated for many years, with only their own fish boats to take them to Astoria or to Cathlamet.

Wahkiakum County early recognized women's place in politics. During the territorial days, women had the ballot and used it. In 1884, Mrs. Mary Irving was elected county superintendent of schools with an annual salary of \$25.00 plus mileage. She was followed by several women superintendents. Mrs. Blanche Heron Bradley, elected auditor in 1914, was the first woman to serve in that capacity in this county and one of the first in the state. Since that time we have had women in every office except sheriff, prosecuting attorney, commissioner, and engineer. Julia Butler Hansen, who served in the state legislature from 1939 to 1960 was the first woman to represent this county at Olympia. She was elected to the 86th Congress in 1960 and has been a Congresswoman ever since. She was the first woman to be chairman of an Appropriations Sub-committee (Interior and Related Agencies).

LAND OWNERSHIP

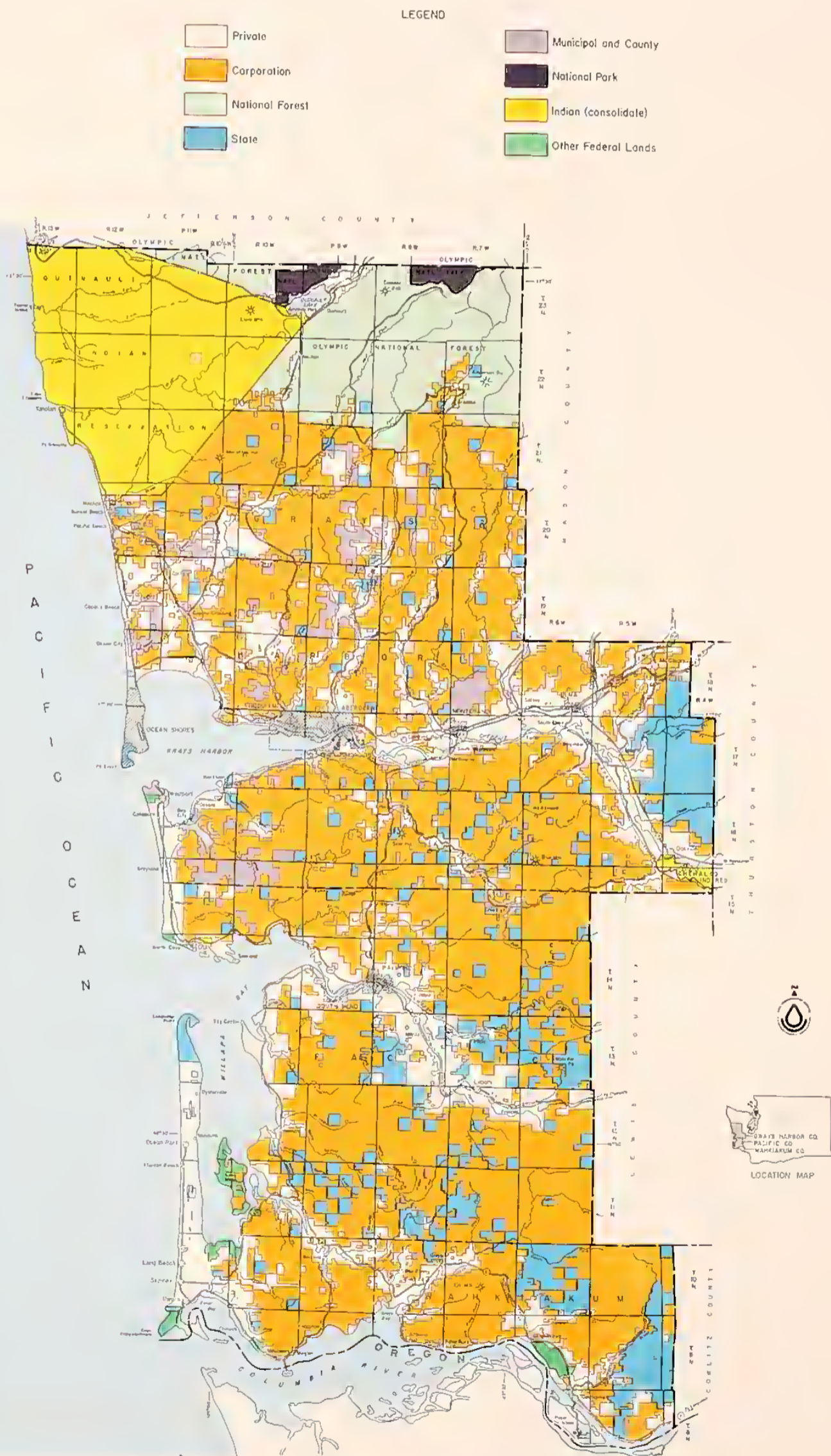
Table no. 2 gives an approximate breakdown of land ownership in the project area. Exact corporate acres* were not available for Pacific County but the Metskers Atlas indicates that large companies own most of the land in the project area. The private sector is the second largest landowner followed by the state and federal government. The smallest landowners in the project area are the counties and the cities. (see map)

TABLE NO. 2 APPROXIMATE LAND OWNERSHIP (ACRES) ^{a/}

Type	Grays Harbor County	Pacific County	Wahkiakum County	RC&D Area
Private	380,838	159,281	36,447	576,566
Corporate	536,445	302,245*	91,170	929,860
Federal	159,530	6,513	1,000	167,043
State ^{b/}	84,647	110,348	23,481	218,476
Municipal	13,830	2,597	923	17,350
County	46,980	266	13,829	61,075
Totals	1,222,270	581,250	166,850	1,970,370

^{a/} Estimated from many sources. All counties need to up-date and refine their figures.

^{b/} From State Lands Inventory, 1970, page 8.



LAND OWNERSHIP MAP
COLUMBIA - PACIFIC
RESOURCE CONSERVATION & DEVELOPMENT PROJECT
GRAYS HARBOR, PACIFIC AND WAHKIAKUM COUNTIES, WASHINGTON

FEBRUARY 1972



INTERGOVERNMENTAL COORDINATION

The United States Department of Agriculture is providing technical services, loans, and/or cost-sharing assistance through the Agricultural Stabilization and Conservation Service, Cooperative Extension Service, Farmers Home Administration, Forest Service, and Soil Conservation Service.

The Agricultural Stabilization and Conservation Service program assistance to farmers often can be related to locally developed resource program projects such as small watershed, woodland improvement, wildlife habitat, and RC&D projects. They often can be related to special program projects which will further community and national environmental goals. ASCS assistance includes cost-share payments for soil, water, woodland, wildlife, and pollution abatement practices under the Rural Environmental Assistance Program (REAP).

The Cooperative Extension Service is one of the first jointly-funded operations of county government, state (in this case Washington State University) and federal (the U.S. Department of Agriculture). Its purpose is to conduct educational programs in Agriculture, and Human and Community Resource Development. Included is the providing of educational leadership for problems bearing on the quality of living of people in their communities. Through resident Extension agents (located in the three project counties), support staff of specialists and other resource people from Washington State University, the Cooperative Extension staff is able to provide local residents or RC&D Committees with a wealth of information and educational support in analyzing community problems, studying alternative ways of achieving goals and in carrying out their plans. WSU's Coastal Washington Research and Extension Unit at Long Beach centers on cranberry research and alternative uses for bog areas.

The Farmers Home Administration makes farm and home loans to rural residents who are unable to obtain credit from other sources.

Their RC&D function will be to make loans to public bodies or non-profit organizations to develop projects that appear in the RC&D plans. These organizations have to show repayment ability from some source but the interest rate is low and the terms are long term.

The Forest Service has a dual responsibility concerning the Columbia-Pacific RC&D area, i.e.: (a) direct management of National Forest Lands, and (b) promoting sound forest management and protection on private and other non-federal lands within the RC&D area. Item (b) is accomplished through Federal-State cooperation programs with the State Department of Natural Resources.

Technical forestry assistance can be provided to accomplish the resource goals of the sponsors. When the RC&D project becomes operational, special federal funds can be requested to provide intensified technical forestry assistance. RC&D funds, based on a plan of work prepared jointly by the Forest Service, SCS and the sponsors may be made available

to provide accelerated forestry services to help the sponsors carry out specific project measures related to forestry. (See Forestry section for more Forest Service information)

The Soil Conservation Service gives technical assistance to individuals, groups, organizations, cities and towns, and county and state governments in reducing the costly waste of land and water resources. This assistance includes soil surveys, watershed flood prevention, erosion control, and conservation planning. Financial or cost-share assistance may be available through the RC&D Program and the PL-566 Small Watershed Program.

The objective is use and conservation treatment of the land in harmony with its capability and needs.

The objectives of the Service are so oriented that:

1. The Nation's soil and water resource base is protected and improved for the good of the people.
2. They are brought to bear on soil and water problems in town-and-country and urban-suburban environs, resulting in gains in environmental quality.
3. They fully support rural development, resulting in increased job opportunities, better facilities, a more stable economy, an improved scale of living, and a better place in which to live.
4. They take into consideration the needs and purposes of all forms of life.
5. They merit support and citizen involvement on the broadest possible scale, resulting in an effective partnership between city, town, and country.

The Economic Research Service can offer research results and professional knowledge to support the promotional, educational, and training activities planned to implement rural development programs. They can undertake research that will help meet some of our objectives.

The civil works mission assigned to the Corps of Engineers embraces the tasks of investigating problems and potentials, considering solutions, and recommending actions to conserve and develop the Nation's water resources to meet the needs of the people of the United States; and of thereafter constructing, operating, and maintaining the public works projects that Congress authorizes. The purposes of such projects include flood control, navigation, generation of hydroelectric power, enhancement of fish and wildlife resources, development of water-based recreational areas and facilities, storage of water for irrigation and for industrial and municipal uses, and water quality control through stream impoundment and flow augmentation. All projects are planned to preserve the natural environment and further the well-being of people as much as possible. Other water-resource activities of the Corps include flood plain management services, emergency flood fighting, and issuance of navigation permits.

Although financial assistance, reimbursement, or other grant-type programs are not available through the Corps of Engineers, limited technical assistance is available to the public and technical and other file data are available upon request. The inventory of coastal waterfront included this three-county area. The model study of Grays Harbor in progress in Vicksburg, Mississippi includes studies that are of importance to the other two counties as well. River flood plain studies are being made at local request.

The Pacific Northwest River Basins Commission has been charged with the job of, first, coordinating all federal, state, and local and related land resource planning in the Pacific Northwest. In order to accomplish this first objective, the Commission is secondly charged with developing and keeping up-to-date a comprehensive joint plan for the water and related land resources of the Pacific Northwest. The three RC&D counties are included in the Type IV Southwest Washington River Basin Study which is presently underway.

The third objective of the Commission is to annually prepare a long-range schedule of priorities for the collection and analysis of basic data and for investigation, planning and construction of projects.

The Commission presently serves as a pooling organization for many persons with various technical skills. The talents of these technical people are available to the public when determined appropriate by the Commission.

The Bureau of Reclamation's major responsibilities are: to investigate and develop plans for potential projects to conserve and utilize water and related land resources; to design and construct authorized projects for which funds have been appropriated by the Congress; to operate and maintain projects and project facilities constructed by the Bureau, and inspect the operation and maintenance of projects and project facilities constructed by the Bureau but operated and maintained by water users; and to negotiate, execute, and administer repayment contracts, water service contracts, and water-user operation and maintenance contracts.

The concept of reimbursability is a controlling and major influence on all reclamation financial and formulation activities. Federal Reclamation Law requires that all costs allocated to irrigation be repaid to the Federal Government over a 40-year period without interest. Annual operation and maintenance costs also must be fully borne by the water users. The law further provides for an initial development period of up to 10 years during which no repayment of construction costs is required. When appropriate, specific projects are authorized to allow for a 50-year repayment period. Irrigators repay construction costs up to their pay ability. Costs beyond the irrigators' ability to repay have traditionally been returned to the Treasury through surplus federal power revenues or other similar means.

In multipurpose projects, costs for flood control, and some parts of costs for designed enhancement of fish and wildlife, recreation, and water quality are nonreimbursable by law. The wildlife costs must be

borne by a non-federal public entity. These reimbursable costs, along with the costs of commercial power and municipal and industrial water supply, must be repaid to the federal government in 50 years with interest.

The National Park Service has a dual mission: to manage the natural, historical, and recreational areas which comprise the National Park System for the continuing benefit and enjoyment of all the people; and to provide national leadership in cooperative programs with other Federal agencies, state and local governments, private citizens and organizations in the preservation of our Nation's cultural and natural heritage.

The Fish and Wildlife Service primary activities will be investigation and studies of proposed projects of other agencies in an attempt to mitigate potential problems affecting fish and wildlife; refuge established for betterment of migratory waterfowl; emphasis placed on providing wintering habitat for black brant and dusky Canada geese.

United States Department of Commerce (Economic Development Administration) requires "Overall Economic Development Plans" be prepared by designated Redevelopment Areas before financial assistance can be provided for industrial and commercial projects, public facilities, and occupational training. Pacific and Grays Harbor Counties have prepared these plans. Through EDA the Department of Commerce has put \$2.5 million into the Grays Harbor economy in the last year. The U.S. Department of Commerce also provides financial assistance through the Small Business Administration.

Department of Health, Education, and Welfare provides a wide variety of health services and grants, research grants; adult education grants, educational training and research; grants for community programs for the aging, blind, disabled, child welfare, juvenile programs, public assistance and rehabilitation.

Department of Housing and Urban Development provides: low rent public housing, mortgage insurance programs, college housing construction, housing for elderly and handicapped, public works planning advances and public facility loans, flood insurance and property improvement loan insurance.

The State Department of Fisheries was created to manage and preserve the state's food fish resources. The food fish resources include the five species of Pacific salmon. The Department operates the biggest and best system of salmon hatcheries in the country. They have kept these fish at high levels despite many threats to their existence.

They aggressively enforce the Fisheries code as it applies to the protection of the aquatic environment with seasons, areas, and catch and bag limits.

They maintain and protect the natural production capabilities of all species of fish and shellfish whether or not artificial production is possible.

They seek out those things that limit production of fish and shellfish and rectify or counteract them.

They discover factors which can increase production of fish and shellfish and apply them.

A fresh water section oversees runs of salmon to rivers and streams, tabulating annual counts of spawning populations, assessing quality of waterflow and necessary stream clearance.

A branch is maintained at Aberdeen where the major interests include razor clams, ocean shrimp, and dungeness crabs. Another branch at Nahcotta works chiefly with oysters in Willapa Bay and is responsible for the management of nearly 10,000 acres of Washington State Oyster Reserves. This includes line monuments and marker maintenance, inventory of oyster stocks, oyster sales, and patrol.

The responsibilities and objectives of the Washington State Highway Department involve the location, design, construction and maintenance of public highways under the jurisdiction of the state. The objective is to provide needed facilities for safe and efficient public travel to the maximum extent possible within the constraints of available funds and established priorities.

Technical advice and service can be made available to the RC&D project to the extent that service and advice is available from material generated to fulfill the Department's needs. No separate staffing can be afforded and no separate financial assistance is available to the RC&D by the Department.

Technical data such as design criteria, traffic information and accident data can be furnished readily and within reasonable limits of quantity at no cost.

The Interagency Committee for Outdoor Recreation (IAC) was established by the Marine Recreation Land Act of 1964 (Initiative 215). A primary function of the Committee is to administer funds and provide grants to local and state agencies from the state's General Fund Outdoor Recreation Account, which includes monies derived from unclaimed marine fuel tax refunds, the sale of bonds under Referendums 11 and 18, and the state's apportionment of the federal Land and Water Conservation Fund. In addition, the Committee has the authority and duty to prepare, maintain and keep up-to-date a comprehensive statewide outdoor recreation and open space plan.

The IAC grants money on a matching basis from the Outdoor Recreation Account to eligible states and local agencies of government to be used for capital acquisition or development of public outdoor recreation and open space areas and facilities.

Any agency is eligible for funding assistance provided that it is a public agency such as a county, city, town, port district, park and recreation district, metropolitan park district, or other municipal corporation or a state agency empowered by law to acquire or improve outdoor

recreation lands; provided, also that the agency has officially adopted and submitted to the IAC a comprehensive plan that meets IAC requirements for a park and recreation plan.

The State Department of Commerce and Economic Development attempts to affect those decisions of individuals in the private and governmental sectors which bear upon the development of the state's economy. The Department attempts to affect these decisions by providing skilled analytical and informational services. These services may take the form of providing marketing data for new existing or potential business, aiding a local development group, promoting industry to its region, locating financial sources for new or expanding business, promoting Washington developed products for foreign export, increasing tourist travel in the state, supplying technical data for industry, or promoting more extensive use of nuclear energy in peaceful pursuits.

In addition, the Department in its liaison role between state government and the business community recommends changes in regulatory or other state government functions in the interest of orderly economic growth.

The Department of Ecology's basic goals are to: (1) identify and determine the abundance and quality of the existing environmental resources and to provide for the care, protection and perpetuation of those resources through the establishment of appropriate standards for air, water and land; (2) analyze the availability of environmental resources and determine appropriate uses consistent with environmental resource standards for protection of the air, land and water through issuance of appropriate authorizations; (3) measure the environmental resources and measure the natural and man-caused influences which change or tend to change the environment; (4) plan for the future conservation, perpetuation and uses of the environmental resources and to develop programs responsive to the needs and problems of the environment and assign the human and economic resources available to the Department.

Technical and/or financial assistance is provided by the Department through various programs as follows:

1. Federal and state grants for construction of water pollution control or abatement facilities.
2. Technical, financial and educational assistance to land occupiers. (soil and water conservation district program)
3. Financial assistance for flood control construction, maintenance and improvements.
4. Administrative and technical aid in organizing flood control districts.
5. Loans for the construction expansion, improvement or replacement of water distribution systems, water collection facilities or protection works.
6. Technical assistance and state financial aid to local air quality control programs.
7. Technical assistance, training and education in solid waste disposal.

The State Soil and Water Conservation Committee* shall encourage and direct the State's sixty-six soil and water conservation districts to assist land users to plan and apply conservation programs to all lands, that will result in said lands being used in accordance with their capabilities and be treated in accordance to their needs for protection and improvement.

The Committee will devote their efforts to assisting district governing bodies in creating opportunities for accelerating the development, utilization and conservation of all renewable resources within the districts, encourage district boards to report to their people on district accomplishments and to establish policy by which to operate effectively as a resource agency.

The Committee does not have a staff to provide technical assistance, but it will assist in obtaining technical assistance from federal and state agencies.

The Committee administers a State Grant Fund for Soil and Water Conservation Districts in an amount of \$20,000 per biennium which shall be used to promote projects for accelerating planning and application of conservation programs.

The purpose of the Game Department is to preserve, protect, perpetuate and enhance wildlife through regulations and sound continuing programs, to provide the maximum amount of wildlife-oriented recreation for the people of the State.

The agency was given the right to set seasons, buy lands materials needed, enforce game regulations, and all such means necessary to perpetuate the wildlife of the state, while providing for an annual harvest of game species by hunters and fishermen.

They are responsible for direct manipulation of pressure upon game animals and birds and have management authority over a wide variety of non-game animals and birds, including fur-bearing animals and control of game damage.

They are responsible for research, propagation and planting of all game fish in Washington. The authority to improve and conserve game fish habitat also falls within their jurisdiction.

They are not only responsible for land acquisition and operation of the state's Wildlife-Recreation Areas, but also for detailed game and fish species research and mitigation of wildlife losses caused by the construction of hydroelectric projects.

Acquisition and development is in three major categories:

1. boating areas, which include parking and boat launching ramps
2. freshwater shorelands, which include water-oriented projects other

*Department of Ecology

- than boating (for example, streambank easements for fishing)
3. Key ecological areas, which include the Department's acquisition and development of wildlife recreation areas

The Department's operating revenue comes primarily from the sale of hunting and fishing licenses.

They are responsible for the design, construction and maintenance of installations and equipments: hatcheries, game farms, Wildlife-Recreation Area Facilities, public access areas, fish protective screens.

The Parks and Recreation Commission is in charge of acquisition, development and operation of State Parks within the State of Washington. Existing parks within the Columbia-Pacific Resource Conservation and Development Project boundaries are Ft. Canby, Ft. Columbia, Leadbetter Point, Twin Harbors, Grayland Beach, Westhaven, Ocean City, Lake Sylvia, and Griffiths-Priddy Ocean State Parks in Pacific and Grays Harbor Counties. Also, under the jurisdiction of the Washington State Parks and Recreation Commission are the historical sites and markers at Lewis & Clark Campsite, Willie Kiel's Grave, Columbia River, and Bruceville-Bruceport.

In 1967 the State Legislature by passage of S.S. Bill #414 created the Washington State Seashore Conservation Area and gave to the Washington State Parks and Recreation Commission, jurisdiction over the State's ocean beaches from Cape Disappointment to Cape Flattery, exclusive of any lands within the established boundaries of any Indian Reservation. Under this act the State Parks Commission has acquired and developed lands to provide off beach parking and sanitary facilities on or adjacent to the Ocean City, Oyehut, Twin Harbors, Grayland, and County Line beach access roads and has purchased additional areas for development at Cranberry Road and Loomis Lake on the Long Beach peninsula.

The Planning and Community Affairs Agency through its statutory review and advisory activities ensures that local and regional planning and development efforts are in general agreement with the state's long-range goals.

The five major program areas in support of state-wide comprehensive planning and community development are: local planning assistance, community services, training and education, comprehensive health planning, and law and justice planning.

While the pattern and character of assistance are diverse and broad in scope, the key elements are cooperation with and service to planning commissions, citizen groups, county and city governments, and state and regional agencies.

The Employment Security Department's primary responsibility is two fold: (a) to furnish through the Unemployment Insurance program funds commensurate with past earnings, to those who are unemployed through no fault of their own; (b) the Employment Service Program is charged with several functions: assistance to employers in finding qualified employees, the gathering of labor market information, service to the unemployed in locating suitable employment, service to veterans, assist in development

of new industries in the area, development of various programs designed to remove the "hard core" unemployed from public assistance rolls.

Technical assistance through Department functions consists of Job Analysis for employers, testing and interpretation of test scores for employees, counseling of potential employees, gathering of background or statistical data for studies which might assist in area development and other services having to do with jobs, job development, and other training.

Financial assistance programs vary from time to time as Federal Manpower programs change, however, in one category or another, the Department normally is able to furnish "on the job" training funds, reimbursement for Work Experience Contracts, institutional training and combined work training/institutional training.

The State Department of Natural Resources: See Forestry section.

There are many local governmental units in the project area in addition to the RC&D sponsors that provide invaluable day-to-day services to the people in the tri-county project.

These commissions, councils, and special purpose districts are far too numerous to describe in detail in this resource action program. All too often they receive no recognition at all: In the project area as of March 1, 1970 there were seven Road districts, twenty-seven School districts, three Public Utility districts, one Library district, seven Port districts, twenty-three Fire districts, nine Water districts, one Hospital district, three Cemetary districts, three Sewer districts, and one Flood district. 1/

1/ State of Washington, Pocket Data Book, 1970.

PART TWO

RESOURCE SECTION

Entrance sign at the Cathlamet School District's Outdoor Classroom Area.

SCS PHOTO ORC-265-3



Razor Clam digging is popular at beaches in the Project Area. WAYNE O'NEIL PHOTO



AGRICULTURAL RESOURCES

Cranberry harvest on Long Beach Peninsula.

WAYNE CONNELL PHOTO



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AGRICULTURAL RESOURCES

Too often urbanization is forced upon agricultural land for unfair and unscientific reasons. The project area offers instances in which good farm lands with poor soil characteristics for urban uses have been preempted by housing developments, industry and other urban uses. These lands have definite agricultural value but may be unusable as leach fields for septic tank effluent. Well established farms, even when not endangered by land use changes, are subject to severe economic problems. Poor markets, lack of processing and storage facilities and high cost of production have forced many people off their farms. Small family farm units are declining due to spiralling costs and low market prices. Migration into cities of farm youth seeking other types of employment has drained agricultural communities of their more talented and better educated young people, while adding to the problems of the already congested and over-taxed cities.

Agricultural land use may create pollution problems, although in most instances such problems have in the past been considered minor. But, as land use changes and agricultural innovations result in single product farms or higher concentrations of livestock, pollution from either fertilizers, pesticides or animal wastes becomes a real problem. In the past, animal wastes spread over large land areas seemed to present few environmental problems. The dairy industry, for example, is presently faced with a major waste disposal problem.

Silt as a pollutant has not been fully recognized as such in the project area. Land stabilization measures are needed to reduce such pollution. There is a need to create public awareness through information and education programs.

Cost sharing to assist farmers in conserving their land has not been adequate. Cost sharing to establish long term conservation practices on suitable soil must continue to be given priority over short term practices. All conservation practices and treatments should be carried out in an orderly manner.

Many farmers have conservation plans which are important to proper land use. Developing conservation plans can help other landowners as well. Cost sharing in conservation treatment and conservation practices should be provided to landowners on the basis of a satisfactory conservation plan.

The public has an interest in protecting our basic land and water resources. Farmers should not be expected to shoulder all the responsibility, assume all the expense, and contribute all the time and energy necessary to apply conservation practices. Conservation must be continuously practiced by the land users and society should devote a part of its wealth to assisting landowners technically and financially in carrying out sound conservation programs. The public's contribution to conservation has too often been too little, too late. This RC&D project offers an opportunity for both the public and the private landowner to share responsibility and cost in carrying out an urgently needed conservation program.

Number of farms

The number of all farms in the project area is presently 924. This is 560 less farms than in the year 1964.* The average decrease of farms in the project area is about 38%.

Acres of land in farms

The present acreage: 119,168 represents a decrease of 44,573 acres from the 1964 total of 163,741 or a 27% decline. (see Table A-1 appendix)

*As in the 1960 Census, the farm population consists of persons living on places of 10 or more acres from which sales of farm products amounted to \$50.00 or more in the preceding calendar year or on places of less than 10 acres from which sales of farm products amounted to \$250.00 or more in the preceding year.

(The major difference between 1969 and earlier Censuses is the method of collection. Prior to 1969, an enumerator visited each farm and obtained the information needed to complete the questionnaire. For 1969, the Census questionnaires were mailed to persons or firms thought to be farm operators. There was some follow-up by phone and personal visit but this effort concerned principally commercial farms.

A preliminary review of the Census data indicates coverage may be considerably incomplete for the smaller operations, including part-time and retirement farms. This would have little effect on agricultural production, but would affect a number of farms. We also understand that Christmas tree farms and tree farms for timber production were excluded unless other agricultural operations met the definition above.

In short, there is considerable doubt that the number of farms for 1969 is comparable with 1964.) - J. M. Kitterman, USDA, Statistical Reporting Service, Seattle, Washington.

Average size of farms

The average size of farms increased over the past five years: the average size of farms in the project is 125 acres which is about 16% bigger than the 108 acre farm of 1964. (See Table A-1, appendix)

Percentage of land in farms

In comparing the acres of land in farms of all kinds and sizes to the total land area of each of the counties in the project area in 1964 we find that 7% of Grays Harbor County was in farms, 8% of Pacific County was in farms, and 16% of Wahkiakum County was in farms.

Comparing today's land in farms in each county (1969 Census) to the same total land area (1964 Census) we find that 5% of Grays Harbor County is in farms, 6% of Pacific County is in farms, and 12% of Wahkiakum County is in farms.

Number of farmers

The total of all farm operators dropped from 1,484 in 1964 to 924 in 1969.

The number of "full-time" farmers on farms in class 1-5 (\$2,500 sales and over) who worked off the farm 99 days or less, dropped 9% from 76 to 69 in the project area. The biggest drop was in Pacific County with 35% less "full-time" farmers as described above. The other two counties in the project did not change significantly. (All class 1-5 farm operators rose slightly from 476 to 489 in the project)

The number of part-time farmers dropped 50% in the project area from 842 in 1964 to 322 in 1969. The part retirement farmers dropped 70% in the project area from 239 to 71. (See footnote bottom of page 46)

TABLE 3. PERCENTAGE OF POPULATION RURAL FARM AND NON-FARM ^{1/}

	<u>Rural Non-farm</u>	<u>Rural Farm</u>
Grays Harbor	38.0	4.0
Pacific	72.5	7.5
Wahkiakum	83.9	16.1
Project Average	64.8	9.2
State	23.2	4.2

^{1/} Department of Commerce, U. S. Census, 1970.

Market value

The total value of land and buildings in farms in the project area is \$57,406,828. (Grays Harbor County \$29,175,147; Pacific County \$18,530,708; Wahkiakum County \$9,700,973.)

The market value of all agricultural products sold, exclusive of forest products, from the project area in 1969 was \$10,489,820. This is a 35% increase over the 1964 market value. (See Table A- 11, appendix)

The market value of crops including nursery products and hay was \$2,261,577 for the project area and the market value of livestock, poultry and their products was \$8,228,243 for 1969. This indicates that in the project area the value of livestock products is four times that of crops.

Cropland

Of the 924 farms in the project area 857 of them reported 57,790 acres of total cropland (13% less harvested than in 1964); 711 of them reported 34,429 acres of harvested cropland (9% less harvested than in 1964) and 612 of them reported 31,699 acres of cropland used only for pasture or grazing (7% less cropland used for pasture than in 1964.)

Irrigation

There were 6% more farms in 1969 that reported irrigated land in the project area. The acreage under irrigation in the project increased 30% from 4,224 in 1964 to 6,555 in 1969. Some potential need may exist for agricultural water from multi-purpose water storage projects.

Cranberry production

Cranberry production and processing is a unique and significant agricultural enterprise in the project area. It began commercially in the early 1880's when Anthony Chabot planted about 35 acres on Long Beach peninsula. Chinese labor was used to develop some of the first bogs and Indians helped with the harvest.

Today there are about 156 growers with 1,131 acres. 34 of these growers with 430 acres are located on the peninsula. 122 growers with 701 acres are located at Grayland and North Beach.

Almost the entire cranberry acreage in the State of Washington is located in the project area and it accounts for 6% of the nation's production.

The 1971 Washington crop of about 14,200,000 pounds at an expected price of 11¢ per pound will be worth about \$1,562,000 gross to local growers.

According to the census of agriculture the market value of all crops in the project area in 1969 including nursery products and hay was \$2,261,577. Of this amount 75% was from "fruits, nuts, and berries" which in our area is almost entirely cranberries. The 1969 Washington cranberry crop of about 11 million pounds averaged 16¢ per pound. It was thus worth about \$1,760,000 gross or roughly \$1,500 per acre before expenses.

The Ocean Spray processing plant at Markham processes all the West Coast berries produced in Washington, Oregon, and British Columbia.

"In fiscal year 1971 the plant and its' operations represented a 6.2 million dollar enterprise. It provided about 75 permanent and 175 seasonal jobs with a payroll of over \$800,000 exclusive of supervisory personnel." 1/

A large variety of cranberry products are shipped from the Markham plant: These include juices such as cranberry, cran-apple, grape-berry, and cran-prune including a choice of regular or low calorie. They also produced jellied cranberry sauce, whole berry sauce, and cranberry-orange relish also available in low caloric form.

Producers of local cranberries are members of the Ocean Spray Co-operative. Acres and yields recorded between August 1968 up to and including the 1973 crop will be used to determine the "cranberry base" for each producer nation-wide. The average of the two best years of these six will be used to compute the base.

With minor exceptions no one can get a base of bogs developed after August 1968. There is no direct restriction on acreage but the orderly marketing program of the growers through a federal marketing order discourages planting.

Other areas, notably Oregon, Wisconsin, and British Columbia significantly increased their acreage prior to August 1968. The acreage in Washington did not make a comparable growth.

Each year a determination of the marketable berries, fresh or processed, is made based on last years industry-wide sales plus 10%.

If the new crop of fresh berries is determined to be in excess of demand a marketing committee composed of seven growers (three independents and four Ocean Spray throughout the U.S.) decided the amount of excess by a 5-2 vote. This excess is "set aside" or withheld from the market.

If future market conditions improve, additional acres of new plantings and their locations will be determined by the marketing committee.

This is one of the few agricultural products not supported by government subsidies. The cost of the marketing committee is paid by all the growers through assessments on their crops.

1/ Ocean Spray Cooperative, Frazier, Glenn, Quinby, etal, 1971.

The bog soils are primarily Seattle, Orcas and Shalcar soils which are poorly drained organic soils within the Duneland-Yaquina soil association. (see general soils map following page 23)

Beef cattle

The number of beef cattle and calves on class 1-5 farms rose from 15,783 head in 1964 to 18,832 head in 1969. Included in these totals are the number of beef cows which rose from 3,452 head in 1964 to 5,065 head in 1969. (see Table A- 7 , appendix)

Beef sales on class 1-5 farms amounted to \$1,253,949 in the RC&D project and was rather evenly divided between the three counties.

The total number of cattle (including dairy) on all farms in the project in 1969: 32,832 head, decreased considerably from the 39,909 head reported in the 1964 Census (see Table A- 9 , appendix). Project-wide this is an 18% drop in the number of all cattle.

The number of cattle (including dairy) on class 1-5 farms (sales of \$2,500 per year and over) in the project: 27,576 head, increased slightly since the last census. (see Table A- 7 , appendix) 84% of all cattle in the project area are on class 1-5 farms.

The number of cattle (including dairy) on small farms (under \$2,500 sales per year) in the project dropped 61% from 13,366 in 1964 to 5,256 in 1969. Small farms raised only 16% of all the cattle in the tri-county project area in 1969. (see Table A-6, appendix)

Dairy farming

99% of all the milk cows in the project are on class 1-5 farms. There has been a 22% decline in the total number of milk cows from 1964 to 1969. (see Table A -9 appendix)

Several things have occurred as indicated by the Census figures: The first is the overall decline of all cattle on all farms. The second is the marked decline of beef and dairy animals on small farms. The third is the significant shift from dairy to beef by the "commercial" or class 1-5 farms as indicated by the figures in the section on beef cattle. Milk cows dropped from 10,760 head to 8,744 head during this same period.

The value of dairy cattle and dairy products from class 1-5 farms is \$6,545,168 for the project area. It cannot be determined from the census tables what the value of dairy products is from all farms. The value of dairy cattle and products from class 1-5 farms amounts to 80% of the total livestock value of all farms.

Horses

"The growing popularity of horses is having a significant economic impact on the burgeoning leisure time industry. Besides affecting the feed, drug, and veterinary and related industries, the horse population explosion has also spawned vast growth in horse shows. State and federal agencies are seeking assistance in the orderly development of public lands for multiple recreation use to include horse facilities and riding trails." 1/

The official 1969 Census figures indicate a horse population of 615 in the project area. The 1971 Cooperative Extension Service horse survey for equine encephalitis control shows a population of 3,469 horses. It is felt by some that even this count may be 10% below the actual number: Grays Harbor County has about 2,659 horses, Pacific County about 560 and Wahkiakum County about 250. (see Table A- 8 , appendix)

Poultry, hogs, sheep, goats, and other

The number of hens and chickens on all farms dropped considerably between the 1964 and 1969 Census: from 77,544 to 11,398. (see Table A-10 , appendix)

The sale of poultry and poultry products from class 1-5 farms in 1969 was \$64,846. Poultry, poultry products, hogs, sheep, and goats represent 6% of the livestock market value. The present inventory of other livestock as of 1969: 486 sheep and lambs; and 128 hogs and pigs. (see Table A- 8 , appendix)

Opportunities, needs, problems

1. The manure produced by all the cattle (32,832 head) in the project area amounts to about 600,000 tons per year. This is equivalent to a human population of 538,445. Rainfall, surface flooding, and runoff are high in the tri-county project (see Runoff map page 26). Dairy producers are being required to examine their manure handling and disposal systems by pollution control authorities. Wise solid waste management is imperative to preservation of high quality water.
2. Feed represents forty to sixty percent of the total cost of milk production. Top hay and pasture production is essential in order to stay in business. It is estimated by the Cooperative Extension Service that larger acreages of pasture are producing only 40% of their potential production. This is in part due to the use of unsuited forage varieties, lack of fertility, dry periods during the summer, weed competition, high water tables, high cost of modern equipment, and/or poor management.
3. Control the spread of noxious weeds. One of these weeds which is spreading fast is tansy ragwort. It is a deadly poison to livestock since it hardens the liver and brings on quick death.

1/ Cooperative Extension Service, South Bend, Washington.

4. Information on chemical weed control methods and materials is needed by farm operators so they can economically and safely control competitive or poisonous weeds.
5. Major livestock problems are liver flukes and worms. Mastitis is a problem with milk cows. Calcium, phosphorus, potassium, and sulfur are often lacking in pasture and hay diets. Some lumpjaw, skin diseases, and plant poisoning occur throughout the project area.
6. Conflicts occur between wildlife and farmers. Elk herds winter largely on improved pastures and break fences down constantly.
7. Diking of tidelands for pasture development may affect waterfowl feeding and nesting and could very well affect the total estuarine food chain. Diking is now regulated by the Shoreline Management Act.
8. There is a need for adequate zoning and fair taxation of agricultural land.
9. There is a need to develop new crops and new methods of processing and marketing.
10. There is an opportunity for cooperative buying, hauling, and storage of hay and grain.
11. There is a need for improved drainage and streambank erosion control on agricultural land.
12. When the water table in peat soil drops to a point where the surface dries, the peat decomposes, oxidizes and disappears at the rate of one inch or more per year. This breakdown of the peat results in the formation of muck which is half the volume of peat. The breakdown of the surface peat results in a lower surface elevation.

During winter and other periods of high water these depressed bog surfaces are subject to excessive flooding. Peat, being a light soil, will float and be carried off in the runoff. The build-up of muck on the peat surface results in excessive vine growth, and weed growth.

Once the peat is lost by oxidation or erosion it can not be used again for cranberry production.

13. "Resanding is a conservation practice that will prevent drying and cracking of peat soils. It prevents decomposition by checking evaporation and the heavy layer physically protects the peat surface from floating or erosion. Generally, sanding is required every seven years.

The best source of clean, sterile sand is the ocean beaches. The continuous availability of the beach sand is a must to the survival of the cranberry industry." ^{1/}

14. Water is important to the cranberry growers in other ways as well.

Frost damage is prevented or reduced by solid-set sprinkler systems which wet the entire bog at one time. The systems also supply needed summer irrigation. The source of water is the ground water which is exposed in irrigation ponds. Natural fresh water lobes are used, also.

^{1/} Agricultural Stabilization and Conservation Service, Justification Letter, November 15, 1968.

15. Water is also used for cranberry harvest in the Long Beach area. Uncontrolled lowering of water tables by developers could threaten the Long Beach and Grayland industry. Increased seasonal and full-time residents if allowed to "skip develop" between and adjacent to bogs, on soils unsuited to septic tanks, can contaminate the domestic and irrigation water supply.
16. The possible effects on the Grayland cranberry industry of continued shore erosion and northward migration of the shoreline at North Cove has not been determined.
17. Cranberry bogs have a great number of weeds that resist elimination with presently allowed herbicides. Flooding of the bogs contributes to the problem as evidenced by the heavier weed infestations on The Long Beach peninsula bogs.
18. The blackhead fireworm and fruitworm as well as cyclamen mites and cut-worms and weevils all require control by insecticides or miticides. There are also several fungi that affect the fresh cranberries and those in storage.
19. Need for continuation of cranberry experiment station at Long Beach.

FORESTRY RESOURCES

Another load of logs heading for the mill.

ALUMINUM LOGS - THE LOGS OF THE FUTURE



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FORESTRY

History

Since the early 1880's, when the first sawmill was built near Grays Harbor, the forest resource has played a dominant role in the development and economic well being of the project area.

During this period the principal tree species harvested were old-growth Douglas fir, Sitka spruce, and Western redcedar. Lumber from the old-growth forests supplied the needs of the local area as well as the needs of a rapidly expanding building market in California.

Many changes have taken place since those early days. A number of forestry movements that are now national in scope were initiated or were strongly supported by the forest owners in this tri-county area: the Washington Forest Protection Association, the Keep Washington Green Program and the Tree Farm movement.

The private and public forest owners were instrumental in the formation of the Washington Forest Protection Association in 1908 to protect the forest resource from fire.

The forest owners were also active in the development of the "Keep Washington Green" program in 1940, the first such program in the United States.

In 1941, the Clemons Tree Farm was established near Montesano in Grays Harbor County. This was the first certified private tree farm in the United States. Today, 49 tree farms have been certified within the RC&D area.

After nearly a century of harvesting forest products this highly productive forest land continues to be a major supplier of wood fiber to the State of Washington, the nation, and the export markets of the world.

This has been accomplished through better utilization of all sizes and species of trees, increased diversity of forest products, and improved forest protection and management techniques.

Size

Forest land is the major land use in the RC&D project area representing 92 percent of the total land area; a total of 1,819,000 acres.

Ninety-seven percent of the forest land area is classified as commercial forest land; 2 percent is unproductive forest land; and 1 percent is classified as productive reserve such as the Quinault Natural Area in the Olympic National Forest, and a few small State and County Parks.

TABLE 4. FOREST LAND ACREAGE BY COUNTY ^{1, 2/}

(Thousand Acres)

Forest Land	Grays Harbor	Pacific	Wahkiakum	Total
Commercial Forest	1,099	522	141	1,762
Unproductive Forest	21	15	9	45
Productive Reserve	10	2	--	12
Total Forest Land Area	1,130	539	150	1,819

Ownership

The major portion of the commercial forest land, 72 percent, is held in private ownership. Forest industry is the largest owner controlling 55 percent; farmer and miscellaneous private own 17 percent; and the remainder 28 percent is in public ownership.

TABLE 5. AREA OF COMMERCIAL FOREST LAND BY COUNTY AND OWNERSHIP CLASS ^{1,2/}

(In acres)

Ownership Classes	Grays Harbor	Pacific	Wahkiakum	Total
<u>Public:</u>				
National Forest	131,000	---	---	131,000
Indian	133,000	---	---	133,000
Other Public	135,000	67,000	30,000	232,000
Total Public	399,000	67,000	30,000	496,000
<u>Private:</u>				
Forest Industry	488,000	385,000	90,000	963,000
Farmer and Miscellaneous Private	212,000	70,000	21,000	303,000
Total Private	700,000	455,000	111,000	1,266,000
Total All Ownerships	1,099,000	522,000	141,000	1,762,000

^{1/} Timber Resource Statistics for Southwest Washington, United States Department of Agriculture, Forest Service Resource Bulletin, PNW-15 Hazard, John W., 1965.

^{2/} The Timber Resources of the Olympic Peninsula, Washington, United States Department of Agriculture, Forest Service Resource Bulletin PNW-31, Bolsinger, C. L., 1969.

Soils and productivity

The three-county area has long been recognized as one of the best timber growing regions in North America. The high productive capability is due to the combination of favorable climatic conditions and soils.

The major portion of the commercial forest land is located within the Rough Mountainous Land soil association (see General Soils map following page 23). Most of the soils in that association are moderately steep to very steep uplands, medium and moderately fine textured, and are well drained.

Annual rainfall in the project area ranges from 50 inches on the ocean beaches to 220 inches at the higher elevations. In those areas where rainfall exceeds 70 inches per year, the soil beneath the trees always remains moist. The winters are mild, wet, and cloudy while the summers remain relatively cool and dry. The average length of the growing season is about 200 days.

"The potential site productivity of the forest soils range from Site Class I to Site Class IV. The largest percentage of commercial forest land is Site Class II (see Forest Site map following page 69). The average annual growth rate for Site Class II is 550 to 880 board feet per acre per year. This is based on the yield produced in a 60 year old stand of Douglas fir." 1/

TABLE 6. SITE CLASS PRODUCTIVITY BY SITE INDEX AND MEAN ANNUAL GROWTH
(Board Feet Scribner)

Site Class	Indicator Forest Species or Type					
	Douglas-fir <u>1/</u>		Western Hemlock <u>2/</u>		Red Alder <u>3/</u>	
	Site Index	Bd.ft./ Acre/Year	Site Index	Bd.ft./ Acre/Year	Site Index	Bd.ft./ Acre/Year
I - Very High	186+	880+	186+	1,500+	120+	860+
II - High	185 to 156	880 to 550	185 to 156	1,500 to 1,150	119 to 100	860 to 580
III - Moderately High	155 to 126	550 to 250	155 to 126	1,150 to 750	99 to 80	580 to 340
IV - Moderate	125-	250-	125-	750-	79-	340-

1/ The Yield of Douglas Fir in the Pacific Northwest, United States Department of Agriculture, Technical Bulletin 201, McArdle, Meyer, and Bruce, 1961.

2/ Yield of Even-Aged Stands of Western Hemlock, United States Department of Agriculture, Technical Bulletin 1273, Barnes, George H., 1962.

3/ Normal Yield Tables for Red Alder, United States Department of Agriculture, Research Paper 36, Worthington, Johnson, Staebler and Lloyd, 1960.

Forest types *

Western hemlock is the most extensive forest type. Hemlock stands occur at all elevations in the western portion of the project area. Sitka spruce, Western redcedar, and Douglas-fir are often found growing in association with this forest type. Many stands of hemlock now occupy sites that once supported Douglas-fir. In the early days Douglas-fir was the preferred species to harvest while hemlock, a shade tolerant species, was often left. Many sites can successfully support either Douglas-fir or hemlock; but in the western portion, hemlock can produce more fiber per acre than Douglas-fir.

The second most common forest type is Douglas-fir. Though located mainly in the eastern portion, scattered stands may be found throughout the project area. Hemlock, western redcedar, and red alder can be present in stands dominated by Douglas-fir. In the eastern portions of the project area, Douglas-fir is the primary species considered in forest management.

Red alder and bigleaf maple are the most common hardwood species. Many of these stands are occupying sites that have grown conifer timber in the past, but have restocked to hardwood species following logging or fire.

According to the Timber Resource Statistics for Southwest Washington and the Timber Resources of the Olympic Peninsula, the three counties have an inventory of 42.5 billion board feet (International $\frac{1}{4}$ -inch scale) of sawtimber. By volume, 95 percent of the sawtimber is softwood and 5 percent is hardwood. Hemlock stands contain the largest volume of sawtimber with 54 percent, followed by Douglas-fir with 18 percent, 10 percent western redcedar, 7 percent Sitka spruce, and 12 percent other species (see Table 7).

TABLE 7. VOLUME OF GROWING STOCK ON COMMERCIAL FOREST LAND BY SPECIES AND COUNTY

(In million cubic feet) ^{1 2}				
Species	Grays Harbor	Pacific	Wahkiakum	Total Project Area
Softwoods:				
Douglas-fir	770	301	231	1,302
Western hemlock	2,452	1,461	336	4,249
Mountain hemlock	11	--	--	11
Western redcedar	525	170	13	711
Alaska cedar	7	--	--	7
Pacific silver fir	294	97	4	395
Grand fir	1	--	4	5
Sitka spruce	159	210	41	410
Lodgepole pine	73	--	--	73
Western white pine	22	--	--	22
Total	4,317	2,239	629	7,185
Hardwoods:				
Red alder	428	252	65	745
Bigleaf maple	37	4	--	41
Black cottonwood	2	--	--	2
Total	467	256	65	788
Total all species	4,784	2,495	694	7,973

*Forest Cover Types of North America, Society of American Foresters, 1954

¹/ Timber Resource Statistics for Southwest Washington, United States Department of Agriculture, Forest Service Resource Bulletin PNW-15, Hazard, John W., 1965.

²/ The Timber Resources of the Olympic Peninsula, Washington, United States Department of Agriculture, Forest Service Resource Bulletin PNW-31, Bolsinger, C. L., 1969.

Western redcedar is an important timber resource in the project area. The Red Cedar Shingle and Handsplit Shake Bureau estimates that the value of shingles and shakes produced by the 58 bureau member mills located in the project area is approximately \$24,000,000 annually.

Nearly 90 percent of the live redcedar volume is old growth. At the present rate of cutting, it will last about 25 years. These stands will probably be replaced by hemlock or Douglas-fir and managed on a continuous yield basis.

Table 8 shows the acreage of commercial forest land by forest type and county.

TABLE 8. AREA OF COMMERCIAL FOREST LAND BY FOREST TYPE

GRAYS HARBOR, PACIFIC, AND WAHKIAKUM COUNTIES, WASHINGTON ^{1, 2/}

(Thousand acres)

<u>Forest type</u>	<u>Grays Harbor</u>	<u>Pacific</u>	<u>Wahkiakum</u>
Douglas-fir	194	60	25
Sitka spruce	16	19	9
Western hemlock	505	328	79
Mountain hemlock	2	--	--
Western redcedar	109	19	--
Alaska cedar	--	--	--
Pacific silver fir	21	--	--
Lodgepole pine	28	--	--
Red alder	200	91	18
Bigleaf maple	--	--	--
Noncommercial hardwoods	9	--	--
Nonstocked	16	6	9
Total	1,100	523	140

Timber harvest

Nearly 1.3 billion board feet (Scribner scale) was harvested in the project area in 1970. The total acreage cut was 31,504 acres. The average harvest cut per acre was 40,270 board feet (see Table 9).

^{1/} Timber Resource Statistics for Southwest Washington, United States Department of Agriculture, Forest Service Resource Bulletin PNW-15, Hazard, John W., 1965.

^{2/} The Timber Resources of the Olympic Peninsula, Washington, United States Department of Agriculture, Forest Service Resource Bulletin PNW-31, Bolsinger, C. L., 1969.

TABLE 9. SUMMARY OF TIMBER HARVESTED ALL OWNERSHIPS ^{1/}

(In thousand board feet-Scribner Scale)

	Grays Harbor	Pacific	Wahkiakum	Project Area Total
Private land	344,161	581,268	83,827	1,009,256
State lands	8,164	14,145	15,991	38,300
Other public				
Non-federal lands	12,729	--	3,357	16,086
U.S. Forest Service	63,519	--	--	63,519
Bureau of Indian Affairs	139,353	--	--	139,353
Total	569,926	595,413	103,175	1,268,514

The approximate value of the 1970 harvest delivered at the mill was \$89,000,000. Value was based on average prices received at mills as reported by the Agriculture Marketing Service.

The amount of timber harvested in the project area has increased about 50 percent in the last decade.

By volume, 80 percent of all timber harvested came from private forest land, 16 percent from federal agency land, and 14 percent from state and other non-federal public land in 1970.

Western hemlock was the principal species harvested in 1970, which was 48 percent of the total volume, Douglas-fir was second with 22 percent, Western redcedar 17 percent, Sitka spruce 7 percent, other conifer 3 percent, and hardwood with 3 percent. Table 10 shows a summary of timber harvested by species and county in 1970.

TABLE 10. SUMMARY OF TIMBER HARVESTED BY SPECIES AND COUNTY IN 1970 ^{1/}

(In thousand board feet-Scribner Scale)

Species	Grays Harbor	Pacific	Wahkiakum	Project Area Total
Western hemlock	255,400	304,561	61,157	621,118
Douglas fir	99,638	165,505	18,123	283,266
Western redcedar	148,935	62,075	2,487	213,497
Sitka spruce	24,722	49,663	10,239	84,624
Other conifer	27,177	2,089	3,808	33,074
Hardwood	16,468	11,520	4,947	32,935
All species total	570,426	595,413	100,761	1,268,514

^{1/} 1970 Timber Harvest Report, State of Washington Department of Natural Resources.

The largest volume of timber was harvested from stands that were 100 years old or older. This age group supplied 1,063 million board feet (Scribner scale) or 84 percent of the total volume in 1970. Stands that were less than 99 years old comprised 16 percent of the total volume.

The average rotation age for fully managed stands in the project area is considered to be 80 years.

The most widely used harvesting system is the clearcut method. Seventy-eight percent of the total acreage logged in 1970 was done by clearcutting and 22 percent was harvested by selective cutting.

Wood using industries

Forest based industry is the most important industry in the project area. According to the 1970 Washington Mill Survey there are approximately 96 wood using mills in the three-county area.

TABLE 11. NUMBER OF MILLS BY COUNTY AND TYPE IN 1970 ^{1/}

Type	Grays Harbor	Pacific	Wahkiakum
Sawmills			
Softwood	5	3	1
Hardwood	1	--	--
Plywood and Veneer	5	--	--
Pulp and paper	3	--	--
Shake and shingle	55	6	(7)
Special products mills	5	(2)	--
Pallet mills	2	--	--
Total	76	12	8
Total all mills	96	() = local source	

Forest employment

Forest industry is the largest employer in the three-county area. According to local sources, approximately 8,000 people within the project area are employed by forest related industry.

^{1/} Washington Mill Survey, Wood Consumption and Mill Characteristics 1970, State of Washington Department of Natural Resources, Berg-voll, John A., and Holtcamp, Ronald J., September 1971.

Log export industry

There are 14 log export operations within the project area. In 1970 this represented 25 percent of the total log export operations in the State of Washington. The facilities are located mainly in the Port of Grays Harbor and the Port of Willapa Harbor. The volume of logs exported during 1970 was approximately 416 million board feet.

The export of logs from the project area contributes to a favorable balance of trade (see Table 12).

TABLE 12. VOLUME OF LOGS AND LUMBER EXPORTED BY

PORT AND PRODUCT IN 1970 ^{1/}

(In thousand board feet-Scribner Scale)

Destination	Port of Grays Harbor		Port of Willapa Harbor	
	Logs	Lumber	Logs	Lumber
Coastwise (California)	--	17,670	--	1,400
Orient	371,710	134	44,235	--
East Coast	--	13,075	--	25,247
Total	371,710	30,879	44,235	26,747

Special forest products

A wide variety of special forest products are produced on forest lands within the project area. In 1969, the income received by local harvesters was in excess of \$1,500,000. The harvesting of special forest products provides part time employment to many of the local residents.

Special forest products include such items as split cedar shakes, and posts, floral greenery, Christmas trees and boughs, wild fruit, fire-place wood, roundwood products, seed cones, and native landscaping plants. Table 13 shows types of special forest products and income received by harvesters.

TABLE 13. VALUE OF SPECIAL FOREST PRODUCTS BY COUNTY ^{2/}

(In dollars)

Product	Grays Harbor	Pacific	Wahkiakum	Total
Split cedar shake (dvalue only)	\$ 672,000	\$ 252,000	\$ 84,000	\$ 1,008,000
Floral greenery	209,280	23,550	2,000	335,130
Wild fruit	44,100	18,600	2,300	65,000
Christmas tree	42,500	11,100	10,300	62,900
Small roundwood	28,560	15,610	--	44,170
Split cedar post	16,400	3,750	1,750	21,900
Christmas boughs	4,300	9,100	6,600	20,000
Native transplant	9,000	7,100	--	16,100
Total	\$1,025,140	\$ 441,110	\$ 106,950	\$ 1,573,200

^{1/} Port of Grays Harbor, 1970 Annual Report

^{2/} Special Forest Products, 1969 Harvesting Report, Oregon and Washington, United States Department of Agriculture Forest Service, 1970.

There are four Christmas tree farms in the project area, three in Grays Harbor County and one in Wahkiakum County, for a total of 77 acres.

According to the Pacific Cascara Company, 50 percent of the world's supply of cascara bark is produced within the project area. Extracts of this bark are used as a laxative.

Forestry industry program

Forest industry is the largest owner of commercial forest land in the Columbia-Pacific RC&D project area. The individual timber companies that make-up the forest industry own and manage approximately 960,000 acres.

The objective of forest industry is to intensively manage their lands in a manner consistent with acceptable forest practices. Intensive forest management will increase yields, insure a continuous supply of wood fiber for future years, stabilize jobs and economic growth of the area and provide a profitable economic return to the individual companies.

Presently, forest industry is regenerating their lands at a rate in excess of 20,000 acres per year. Cutover lands are being planted so that they will be in production within one year following harvest. A minimum acceptable standard of plantation survival is considered to be 85-90 percent. Non-stocked or poorly stocked lands are being rehabilitated and brought back into full production. Rehabilitation activities on non-stocked or poorly stocked lands will take place on approximately 30,000 acres by 1980.

Over-stocked stands are pre-commercially thinned to provide maximum growth. Plans call for approximately 4,000 acres per year to be pre-commercially thinned.

Fertilization of forest stands is being accomplished at a rate of 15,000 acres per year. Plans call for a substantial increase in the number of acres to be fertilized annually.

Protection of forest stands from fire, insects, disease and animals is a major activity of the forest industry. During periods of critical fire weather industry lands are kept under constant surveillance and all management activities are sharply curtailed. Animals such as mountain beaver, deer, elk, bear and mice are the biggest threat to establishment of trees on newly planted areas.

Forest industry lands are open to many forms of public recreation, weather permitting. A number of facilities have been provided for this purpose. Parks have been established along state and county roads for use by traveler and sportsman. Self-guided forestry and wood tours have been established for education and enjoyment. Most forest industry land is open to sportsmen during the various hunting and fishing seasons.

Forest industry is continuing its efforts to minimize the impact of various land management activities on the scenic, recreational, and water values of their lands. Soil surveys are being used to make better management decisions such as where to locate roads and to schedule the timing of management activities so that the least amount of soil damage and disturbance will occur.

Department of Natural Resources Program

The duties and objectives of the State Department of Natural Resources are divided into two major categories - governmental services and proprietary management.

Under the governmental services the Department is responsible for the following: forest fire and insect and disease infestation control on State and private lands; producing maximum revenues from State land; encouraging good management practices on private forest lands; policing transportation of logs in the navigable waters and public highways of the project area; and for servicing and improving surveying and mapping.

The Department's responsibilities under proprietary management include: the management of the state-owned agricultural, forest, grazing, harbor, tide, shore and miscellaneous lands. The primary responsibility of the Department is to manage these lands for the greatest long term benefit to the State, the counties, the schools and people in the Columbia-Pacific RC&D project area.

In the project area during 1970, the Department planted and seeded 1,557 acres, clearcut harvested 1,066 acres, accomplished brush control on 732 acres, precommercially thinned 1,039 acres and developed several recreation sites.

Under authority of the Cooperative Forest Management Act of 1950, the State Department of Natural Resources provided technical services to private forest owners, operators and processors with respect to forest management and harvesting, marketing and processing of forest products. The farm forestry program is financed jointly by federal-state funds with each body contributing approximately 50 percent. In the three counties of the Columbia-Pacific RC&D project area, farm foresters have assisted owners controlling approximately 51,000 acres.

Small private forest owners in the project area in 1970 accomplished 1,715 acres of planting, 120 acres of brush control and 1,179 acres of timber stand improvement work.

National Forest Program

The Olympic National Forest has 149,588 acres of federal land in Grays Harbor County. This land is managed under the Multiple-Use, Sustained-Yield Act of 1960. The renewable forest resources - water, timber, forage, wildlife, recreation - are managed so that areas of land produce a

combination of values that best serve the American people at as high a level as can be sustained without harming the land's ability to produce.

Information on National Forest recreation facilities and Wildlife Management may be found in the Recreation and Wildlife resource sections.

Two ranger districts of the Olympic National Forest are responsible for the management of Forest Service land in Grays Harbor County. They are the Quinault Ranger District, headquartered in Quinault, Washington, and the Shelton Ranger District, headquartered in Shelton, Washington.

The following activities illustrate the current planning effort made by the ranger districts to contribute to the welfare and well being of the residents of Grays Harbor County and the surrounding area:

The Quinault Ranger District is managed as the Grays Harbor Federal Sustained Yield Unit. This act requires that all timber and forest products sold from National Forest lands within this Unit be given at least primary manufacture within the Unit or Grays Harbor County. The object of the Act is to stabilize Grays Harbor communities, forest industries, employment, and taxable forest wealth. In 1970, 15.5 million board feet was harvested from the Quinault District in Grays Harbor County. However, the harvest for the entire district (including land in Jefferson County) was 76 million board feet. Today the Quinault District supplies 23 percent of all timber manufactured by the Grays Harbor mills.

The Quinault District has about 136,770 acres (including land in Jefferson County) of timber lands suited to regulated cuts, and contains 6.3 billion board feet of timber. This timber is about 80 percent white wood pulp species such as Western hemlock, Pacific silver fir, and Sitka spruce. Douglas-fir and Western redcedar make up the remaining 20 percent of this volume.

A recent timber inventory of the District indicates that 85,485 acres (about 62 percent) are in stands in excess of 160 years of age. Twenty-three percent of the area is in age classes under the District's planned rotation age.

Regeneration cutting of the oldest most decadent stands is planned. All stands 160+ years of age will be harvested in 50 years. Clearcutting will be the principle harvesting method used to obtain regeneration. For the ten year period, ending in June of 1979, the Quinault District's estimated yield will be 925.4 million board feet of timber or 92.5 million board feet annually. Of this annual yield, approximately 69 million will be regeneration cutting while mortality salvages, commercial thinning, and small cedar sales will make up the remaining 24 million yield.

The Shelton Ranger District is part of the Shelton Cooperative Sustained Yield Unit. This Act requires that at least 80 percent of the timber and forest products harvested from National Forest lands within this unit must be sold to the Simpson Timber Company and be given at least primary manufacture within the communities of McCleary or Shelton,

Washington. It is the only such Unit of its kind in the nation. The objectives of this unit are much the same as for the Grays Harbor Unit; to assure a continuous and ample supply of forest products to these communities.

In 1970, 54 million board feet of timber was harvested from the Shelton Ranger District's land in Grays Harbor County. The estimated average volume per acre of standing timber in Grays Harbor County is 40-50 thousand board feet. The estimated annual allowable cut for the entire Shelton Ranger District is 146 million board feet. Approximately 45 percent of this cut will come from lands within Grays Harbor County.

Douglas-fir is the most common tree species comprising 50 percent of the stands in the Shelton District. Western hemlock is second with 30 percent. The average age of both of these species is in excess of 160 years.

Reforestation on both of the Districts is accomplished by either planting or natural regeneration. Approximately 2,000-2,300 acres are hand planted annually with Douglas-fir seedlings.

Timber stand improvement, in the form of precommercial thinning, is presently being accomplished at a rate of 800 acres per year. In the future this is expected to rise to 1,600 acres. There is currently a backlog of approximately 12,000 acres in need of precommercial thinning. Future plans also call for annually fertilizing acres of young plantations.

Fixed-wing aircraft are utilized for detection purposes during periods of fire danger. Fire suppression crews and a helicopter are available in the event of fire.

Slash hazard reduction is carried out in areas where timber harvesting results in heavy logging slash. The over-mature condition of the timber harvested creates very heavy logging slash and is a potential fire threat to existing timber stands.

Bureau of Indian Affairs Program

Forested Indian trust lands on the Quinault Reservation are managed under the sustained yield concept with primary consideration for the improvement of the economic welfare and social position of the Indian people.

There are approximately 133,000 acres of commercial forest lands in Indian ownership within the project area. In 1970, timber was harvested on 2,210 acres principally by the clearcut harvesting method. The volume harvested totaled 139,353 thousand board feet or approximately 24% of all timber harvested in Grays Harbor County. Western redcedar was the leading species harvested with 82.8 million board feet. Western hemlock was second with 42.4 million board feet. The average age of timber harvested was in excess of 160 years old.

The average potential growth rate is approximately 1,000 board feet per acre per year. Regeneration is accomplished mainly by natural reseeding. Seventy to eighty percent stocking is established within five years after harvesting. Supplemental planting is done in areas that have been damaged by wildfires.

Forest fire protection is accomplished through a contract with the State of Washington, Department of Natural Resources.

Opportunities, needs, problems

The regeneration of logged off lands by small landowners is a major problem. If small woodlands are to reach their full forest resource potential, it is imperative that the owners be contacted and encouraged to reforest and apply good woodland management practices. They should be informed about the REAP cost-share program and encouraged to seek other available technical assistance.

Many owners of small tracts of woodland need financial assistance to apply management practices to the land. This is particularly true when there is a long waiting period before any income is realized from timber sales. Long-term low interest loans are needed.

Erosion is a problem in some woodland areas. Logging roads and improper culvert installation are a major source of sediment in streams. Landowners should be encouraged to study and seek technical help for review of proposed road locations prior to construction so that the least amount of erosion will occur. Proper logging techniques and road construction and the application of other erosion control measures will help reduce the amount of siltation in the streams.

One of the major problems in establishing trees on newly planted areas is damage caused by animals. Deer and elk browse on young seedlings causing them to grow deformed. Mice girdle young seedlings and mountain beaver chew off the new growth. There is a need for more effective animal repellants for seedlings.

Redcedar waste and logging debris clean-up utilization is practically non-existent. Low grade cedar logs, small Douglas-fir, hemlock, and red alder stands do not have a strong market demand. The entire project area has a very limited small business base to remanufacture the wood products that are created.

Better utilization of trees harvested is needed to increase both net production and landowner income.

A forest products utilization and marketing specialist is needed in the RC&D project area to find ways of utilizing wood material and wastes which presently have little market demand. This individual could conduct feasibility studies, help locate finances and work with local communities in setting up small wood-using industries. Some small-scale wood manufactures in the project area are making specialty products such

as: doors, piano sounding boards, basketball backboards, surf boards, loading pallets, industrial spools, yard and household items, lath, stakes, cabinets, and furniture.

Utility right-of-ways for power and gas transmission are taking valuable forest sites out of production. There is a need to designate multiple-use utility corridors so that additional forest land is not taken out of production.

Conservation treatment is needed on approximately 55 percent of the commercial forest land. The two major cultural measures needed are establishment and reinforcement and timber stand improvement. Table 14 shows the cultural needs by county and practice.

TABLE 14. FOREST CONSERVATION TREATMENT NEEDS BY PRACTICE AND COUNTY ^{1/}

County	(acres)				
		Commercial Forest Land		Non-Commercial Forest*	
	Treatment Adequate	Establishment and Reinforcement	Timber Stand Improvement	Establishment and Reinforcement	Timber Stand Improvement
Grays Harbor	377,000	343,000	240,000	8,500	2,500
Pacific	268,510	414,854	96,258	5,293	2,059
Wahkiakum	66,009	49,155	25,280	1,082	1,000
Total	811,519	534,009	361,538	14,875	5,559

*Poor site conditions or withdrawn from commercial timber use by statute or regulation.

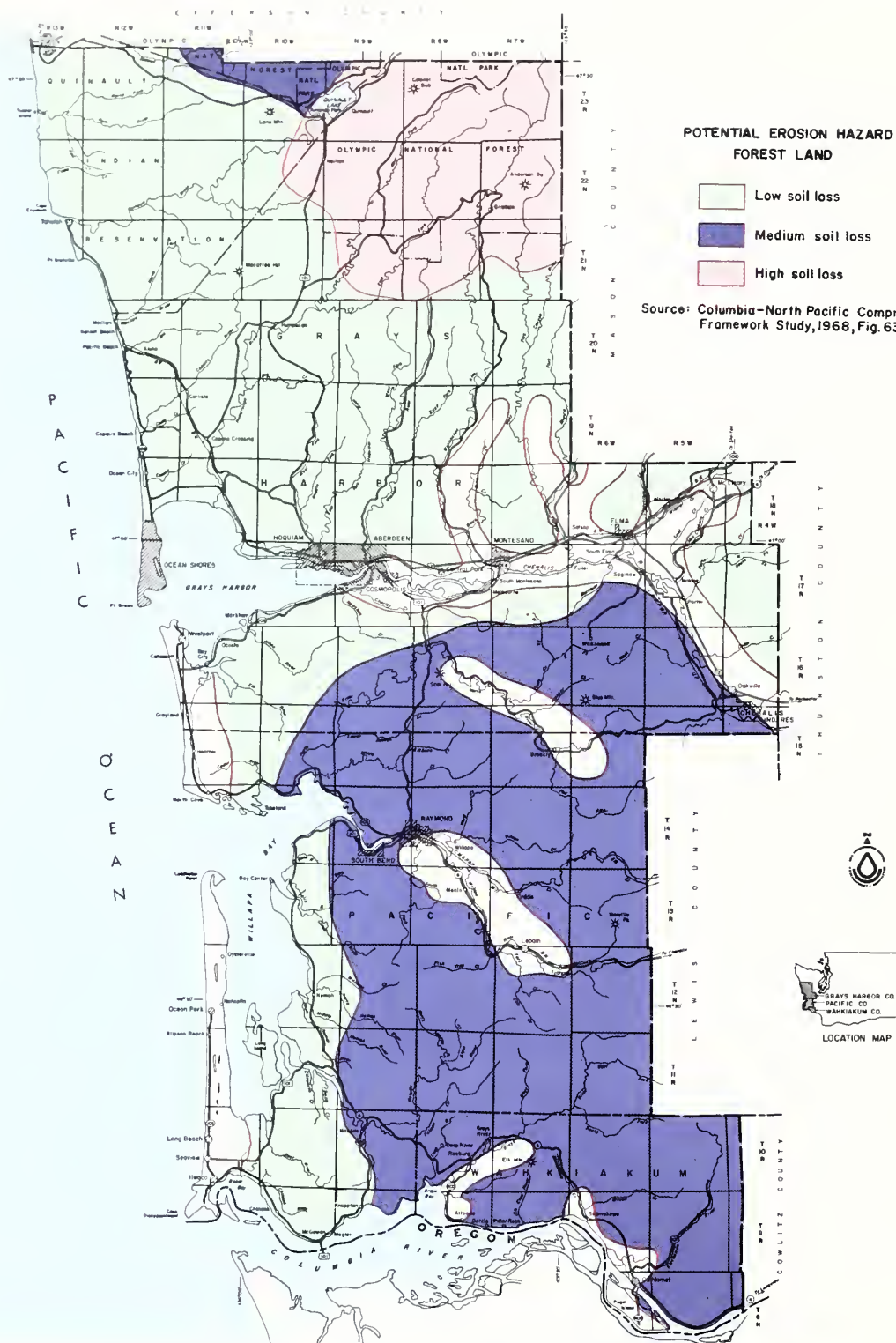
Economic opportunities: An adequate and continuous supply of timber for use by forest industries is vital to the economic stability of the project area. More jobs and higher income, particularly for rural people, will be generated as timber stands are brought under intensive forest management.

Timber supply opportunities: Presently growth equals drain of the timber supply. As old slow growing stands are harvested and replaced by young fast growing stands managed intensively, growth will exceed drain. Understocked stands can be brought up to maximum production by planting or seeding and by timber stand improvement which removes the defective cull, and unwanted trees.

^{1/} Washington Soil and Water Conservation Needs Inventory, United States Department of Agriculture, Soil Conservation Service, Washington Conservation Needs Committee, April 1970.

In addition to the opportunities, needs, and problems discussed above, local people serving on resource committees have identified the following:

1. Encourage cooperative harvesting, transporting, and sale of special forest products - Cascara, fern, salal, etc.
2. Protect the landowners from damage and theft by registration of small products sales and enforcement of existing transportation and trespass ordinances.
3. Consolidate planting stock commitments of private individuals to better utilize the facilities of the Webster State Nursery.
4. Support a kraft mill in the project area, when one is perfected that meets pollution standards, to better utilize cedar and fir residues.
5. Develop a good cooperative management and marketing service, or do this through the Forest Management and Sales Association, Inc. of Chehalis.
6. Support legislation that would make it possible for counties to utilize some of the monies received from sale of county timber to replant and manage their timber lands.



POTENTIAL EROSION HAZARD-FOREST LAND
COLUMBIA-PACIFIC
RESOURCE CONSERVATION & DEVELOPMENT PROJECT
GRAYS HARBOR, PACIFIC AND WAHKIAKUM COUNTIES, WASHINGTON

MAY 1972
SCALE 1:750,000

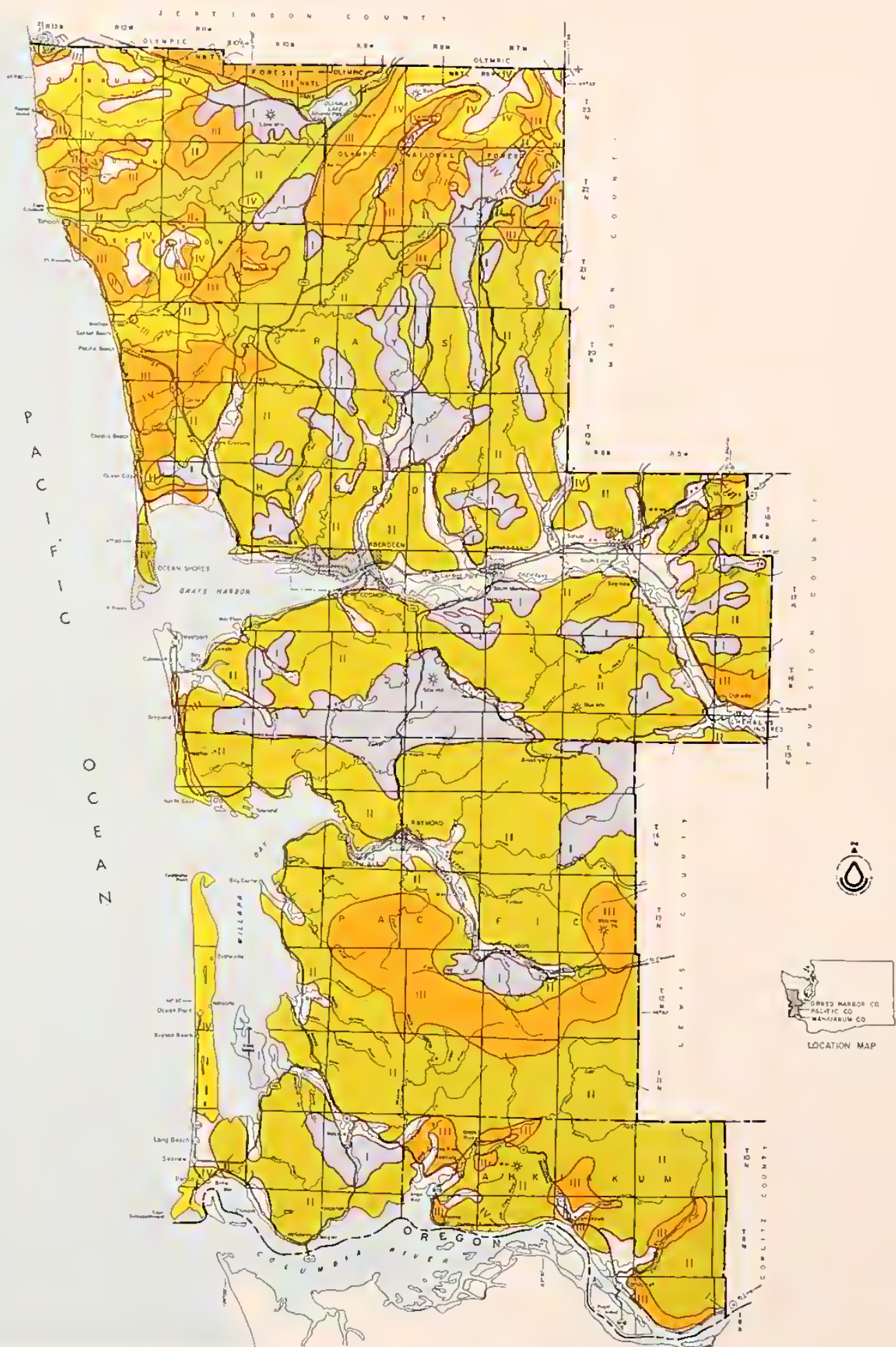
LEGEND

SITE CLASS	SITE INDEX*	AVERAGE ANNUAL GROWTH PER ACRE*
I	186+	880-1080+ Bd. ft. 190- 210+ Cu. ft.
II	156-185	550-880 Bd. ft. 155-190 Cu. ft.
III	126-155	250-550 Bd. ft. 110-155 Cu. ft.
IV	96-125	60-250 Bd. ft. 65-110 Cu. ft.
	Open Areas	

Site map from "Better Douglas Fir Forests From Better Seed", Leo A. Isaac. 1949. Washington College of Forestry. University of Washington Press.

*Site index is a numerical indicator of the timber productivity and refers to the height the dominant tree will attain in 100 years. Potential yields are for Douglas Fir: Reference--USDA Technical Bulletin No. 201. "The Yield of Douglas Fir in the Pacific Northwest."

Data from forest survey records Pacific Northwest Forest and Range Experiment Station.



GENERAL FOREST SITE MAP
COLUMBIA - PACIFIC
RESOURCE CONSERVATION & DEVELOPMENT PROJECT
GRAYS HARBOR, PACIFIC AND WAUKIACUM COUNTIES, WASHINGTON

JANUARY 1972
SCALE 1:100,000



HUMAN RESOURCES

Military Assistance to Safety and Traffic (MAST) helicopters can be called in to help transport seriously injured persons.

R. ROBERTS PHOTO





HUMAN RESOURCES

Military Assistance to Safety and Traffic (MAST) helicopters can be called in to help transport seriously injured persons.

R. ROBERTS PHOTO



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HEALTH

Medical facilities

The existing medical facilities of the project area are as follows: two hospitals operated by the Pacific County Hospital District at South Bend and Ilwaco. Their combined capacity is 61 beds. There are also two rest homes and three clinics in the county.

Wahkiakum County has no hospital facilities. Patients requiring hospitalization must travel to Longview, Astoria, or Ilwaco.

In Grays Harbor County there are three hospitals: one in McCleary and two in Aberdeen for a total of 276 beds.

There are 337 beds in the project area for a combined population of 78,941 or a ratio of 235 people to each bed.

Ambulance service is furnished by private firms or volunteer firemen.

The heliport at the South Bend Hospital recently achieved fully certified status and was built by volunteer community effort coordinated by the Willapa Harbor Lions Club. It is available for use by the Coast Guard, timber company helicopters, and Army helicopters from Fort Lewis. Through a special pilot project Army MAST (Military Assistance to Safety and Traffic) helicopters can be called in to help transport seriously injured persons to a metropolitan hospital in cases where time is critical. The heliport can be used to evacuate serious highway and pleasure boating victims especially during tourist season.

The greatest crisis in health care in the project area centers on the great disparity between the winter and summer populations. The great increase in tourist season health needs are primarily for recreation oriented injuries. Many of these injuries could be handled by emergency care outpatient facilities.

Solid waste (garbage)

The comments of Robert E. Meyer Engineers, Inc. in the 1971 Preliminary Land Use Plan for Pacific County does a good job of expressing the solid waste problems of this area:

"In the past, people recycled a great part of their consumptive needs. Clothing was handed down from youth to youth. Mechanical items were patched and fixed or kept for parts. Foods and household goods were purchased in bulk without the 'benefits' of modern packaging. Persons visited the dump to dispose of unwanted items and to 'reclaim' other's discards. The Saturday afternoon visit to the dump almost became a community social event. A 'waste not - want not' philosophy prevailed in our society.

By the 1960's, this philosophy had largely disappeared under the influence of Madison Avenue and T.V. and the era of the 'disposable society' had arrived. Pacific County, like the rest of the nation, suddenly had a significant solid waste problem.

Garbage (solid waste) no longer consists of items which are easily degradable. Many discarded articles are made of plastic and glass, both of which are very stable, or many forms of undecomposed and partially decomposed putrescible material. The stable materials can lead to voids and pockets within a dump while the partially decomposed organics will not fully burn but remain to become breeding grounds for rats, flies, and other disease-carrying vectors. They also create pollution problems from spontaneous combustion and contamination of ground and surface water.

The Solid Waste Management Act of 1969 legislated all open dumps out of existence by 1972. Air pollution regulations have already eliminated open dump burning except by variance. In 1970 the State Legislature in Extraordinary Session voted \$264,000 for solid waste planning for the entire state. Total requests from counties for funding amounted to more than \$1.2 million. The 1961 Session of the State Legislature passed a mandatory garbage collection act which places the responsibility for garbage collection from all homes on local governments. Pacific County can franchise the provision of this service to private collectors.

Currently, county solid waste planning is being undertaken jointly by the County Sanitarian and the County Department of Public Works. To meet regulations set forth by the State, the Pacific County Board of Commissioners closed a number of open dumps within the county, effective July 1, 1971.

Only the Baleville and North Cove dumps are still operating with the Baleville site designated as the central collection point. It is planned that this dump will have a full-time attendant on hand to inventory the type and amounts of trash deposited. This information will be used for solid waste planning. Both of the dumps are currently continuing to burn under an open burning variance.

State regulations have virtually limited Pacific County to either a sanitary land fill operation or to exportation of solid waste. It is very unlikely that incineration or recycling could be economically practiced on a local basis.

The major problem of solid waste disposal is the lack of good sites for a sanitary land fill in Pacific County. In the north and east portions of the county, high rainfall and clay soils in many areas make siting difficult. On the Long Beach peninsula the possibility of ground water contamination by the highly corrosive land fill effluent creates the need for extraordinary precautions. Also state regulations on siting,

for example, standard distances from river and 1,000 foot setbacks from major highways, place additional limitations of possible sites.

Another major problem in solid waste collection and disposal on the peninsula is the great summer-winter fluctuation in population. While permanent winter population may not exceed 5,000 persons, the summer-time residence is in excess of 30,000 persons at times.

The great variation in county population coupled with political realities on taxation indicate that any solid waste program should probably be financed by means of user charges rather than through an increase in taxes.

The foregoing has briefly outlined the solid waste problem facing Pacific County. Determination of needed solid waste programs and the facilities cannot be made, however, without a thorough Solid Waste Management Study as recommended by the 1970 Pacific County Overall Economic Program.

In Wahkiakum County the public disposal area is located near Grays River. This is a two-acre site that is about 5 percent filled. Other sites are Bar Road and across from Puget Island. This county also needs a Solid Waste Plan to accommodate the expected population increase and tourist influx.

The Grays Harbor County "Application for Solid Waste Management Planning Grant" of July 1970 in response to the request to explain "conditions and circumstances that make improvement in solid waste collection and disposal urgent" expressed the following:

1. Unsanctioned dumping of wastes: estimated 70-80 frequently used, illegal, dump sites. Usually in gulleys or other low areas which collect run-off water...carrying away soluble pollutants into the estuary.
2. Restriction of burning in sanctioned dump sites: common method of solid waste disposal. Allowed only by variance.
3. Climate: heavy rainfall - difficulty in finding disposal sites which can be adequately drained of surface and ground water. Difficulty in maintaining approach roads to waste disposal areas. Difficulty in spreading and stabilizing cover material in land fill operations.
4. Seasonal and short-term population fluctuations. 30 percent growth rate in Grays Harbor County in recreational-residential land development during 1960-70. The solid waste generated by the seasonal and short-term populations is completely outstripping the region's ability to dispose of it.
5. Potential fire threat 80 percent plus of Grays Harbor County is forest and numerous illegal dump sites and in future disposal sites.
6. Franchised service areas: sparse settlement, one-third of Grays Harbor County is not franchised and yields some of the worst illegal dumps.

7. Industrial wastes (industrial solid waste)

- a) Seafood industries produce wastes which decompose readily and must be disposed of quickly.
- b) Solid waste from forest products industry: bark, unusable wood, rock, dirt, sawdust; waste pulp and fiber; boxes, plastic containers, steel bands and scrap iron; cranberry hulls and pea pods; pesticides, herbicides, fertilizer containers; potential wastes from future developments.

(Manure from dairy and beef cattle is also a problem discussed under the agriculture section of the RC&D program.)

Sewers

As reported in the Pacific County Reconnaissance Element, June 1970: "Although municipal sewer systems service Raymond, South Bend, Long Beach, Ilwaco and Seaview, the greater part of Pacific County must rely on septic tanks. Yet due to high rainfall, low land terrain with high water tables and poor soil quality, the suitability of the county to septic tanks and drainfields is very poor.

The County Sanitarian has reported innumerable drainfield failures with raw un-treated sewage running into watersheds and individual water supplies. Areas that should be sewerred according to population concentration but are not: Eklund Park, Old Willapa, East Raymond, Menlo and Ocean Park.

Even where municipal sewer facilities are available, it is noted that the State now requires all municipal sewage treatment systems to receive chlorination. The City of Raymond has taken the necessary steps to add chlorine contact chambers."

Presently, the Pacific County Sanitarian's office will not issue permits for septic tanks and drainfields when the natural ground water table is less than four feet below the surface of the ground...This step will probably accelerate the trend toward sewer systems on the Peninsula in particular.

A serious factor limiting these developments is the planning and financing of sewage facilities. The costs of these developments is beyond the financing ability of these small communities .

The Wahkiakum County Water and Sewer Study, 1970, states that "the town of Cathlamet owns and operates the only public sewer system in Wahkiakum County. The municipal sewer system serves approximately 350 persons representing only 8.3 percent of the 4,200 persons comprising the 1969 population of Wahkiakum County."

In Grays Harbor County according to the Comprehensive Sewer and Water Plan, May 1970, "the problem of sanitary wastes has two aspects. The provision of the necessary treatment facilities for the areas of residential and commercial growth and the provision of sanitary facilities

for the day-user of the ocean beaches. Both are equally important to have the realization of a full tourist and recreation industry.

Problems are increasing where the development of motels, condominiums and other high-density 'housing' are being concentrated in relatively small areas.

The two significant concentrations are occurring at Ocean Shores, and at Westport. Up until 1966 motel development in these areas was of low-density type. The following changes have taken place:

Land has become more expensive thus making it more attractive for the developers to consider three and four-story buildings complete with swimming pools, meeting rooms, and eating-drinking facilities. The season has lengthened and more and more small conventions and meetings are being scheduled for the winter season thus loading septic tank systems during times when they function less efficiently...periods of high water. In addition the use has increased during the 'season' and many systems have failed.

The problem of providing sanitary facilities for the ocean beach day-user was recognized as being the number one problem for continued recreation use of the ocean beaches. All local, public and private interests recognized the problem and their concerted efforts resulted in the 1967 legislature assigning to the Washington State Parks and Recreation Commission the responsibility for solving the problem. Several restroom facilities were built and a beach cleanup program developed. An increased program is contemplated by the Parks and Recreation Commission."

Although answers to all the questions and solutions to all the problems are not available at this point in time, an inescapable fact remains: solutions to waste problems, whether they are liquid or solid wastes, are necessary if (the project area) is to realize the full potential of the tourist and recreation industry.

Opportunities, needs, problems

In addition to the problems discussed above, local people have singled out the following:

1. Develop or improve facilities for mental health, alcohol and drug abuse, and emergency health care in remote areas.
2. Improve health education in the classroom and on the job.
3. Expand senior citizen centers and services and provide them with information regarding emergency health care and transportation.
4. Provide sewage treatment facilities and systems for all communities of the project area.
5. Support county solid waste plans.
6. Start a pilot demonstration project on solid waste disposal in this area of high rainfall including recycling feasibility.

EDUCATION

Median school years ¹/

Median school years completed by persons 25 years of age or older for the project area are lower than for the state as a whole, although the difference in 1970 was not as great as in 1960. There may be a two-fold reason for the lower median school years completed here: Many of those with good educations have left the area because of a shortage of jobs for which they are qualified while several of the major types of employment opportunity within the area do not require a high school degree as a qualification. Thus, a percentage of the students have quit school after the age of 16, and gone to work. The quality of facilities for education is on a par with the rest of the state, and, as can be seen from the following table, the gap in median school years completed has lessened.

TABLE 15. MEDIAN SCHOOL YEARS COMPLETED FOR PERSONS 25 YEARS OF AGE OR

OLDER BY PROJECT AREA AND STATE ¹/

County	1950 (years completed)	1960 (years completed)	1970 (years completed)
Grays Harbor	9.7	10.9	12.1
Pacific	9.7	10.8	12.0
Wahkiakum	9.0	10.3	11.9
Project Area (average)	9.7	10.8	12.0
State of Washington	11.2	12.1	12.4

Elementary schools

There are 18 elementary schools in Grays Harbor County with a combined enrollment of about 6,671 pupils and 257 teachers. Pacific County has 5 elementary schools with a combined enrollment of about 755 pupils and 37 teachers. Wahkiakum County has 2 elementary schools with a combined enrollment of about 608 pupils. The pupils in Grays River Elementary go to high school at Naselle in Pacific County.

¹/ Department of Commerce, 1970 Census.

Parochial schools

There are 4 parochial schools in the project area, all located in Grays Harbor County. The combined enrollment is about 273 pupils and 13 teachers.

High schools and junior high schools

There are 8 high and junior high schools in Grays Harbor County with a combined enrollment of about 5,635 pupils and 268 teachers.

Pacific County has 7 high schools with a combined enrollment of about 849 pupils and 54 teachers.

Wahkiakum County has one high school with about 215 pupils.

TABLE 16. PERSONS 14 TO 17 YEARS - PERCENT IN SCHOOL ^{1/}

<u>County</u>	<u>Percent</u>
Grays Harbor	87.8
Pacific	87.0
Wahkiakum	99.9
State	94.5

Colleges and junior colleges

Grays Harbor College is the only institution for higher education located in the project area. It has a full-time enrollment of about 1,126 students and about 1,982 part-time. It has 53 full-time teachers and 186 part-time teachers. It is a 2 year accredited and provides academic and vocational training. The following vocational training is available: apprenticeship program, home economics, licensed practical nursing, secretarial procedures, auto mechanics, wood and metal shop, electronics, computer programming, business management, and fish or game technology.

Centralia Community College, 2 year accredited, is approximately 16 miles from Oakville.

^{1/} Department of Commerce, 1970 Census.

St. Martin's College in Lacey, a 4 year college, is 20 miles east of McCleary. Evergreen State College, a new 4 year college, is in operation 15 miles east of McCleary.

TABLE 17. YEARS OF SCHOOL COMPLETED ^{1/}

Years	Male - 25 years +			Female - 25 years +		
	Grays Harbor	Pacific (numbers)	Wahkiakum	Grays Harbor	Pacific (numbers)	Wahkiakum
Elementary:						
0	146	20	--	116	41	5
1 - 4	370	141	32	292	73	35
5 - 7	1,474	494	118	1,011	388	37
8	2,607	875	280	2,360	709	168
High School:						
1 - 3	3,544	893	171	3,601	1,093	184
4	5,207	1,554	263	6,643	1,838	397
College:						
1 - 3	1,626	328	117	1,953	443	134
4+	1,396	338	46	889	232	46
Total	16,370	4,643	1,027	16,865	4,817	1,006
Median Completed	12.0	11.7	10.5	12.2	12.1	12.2
Percentage High School Graduates	50.3	47.8	41.5	56.2	52.2	57.4

Opportunities, needs, problems

1. In planning for additional schools it is necessary to reserve sites in advance of construction needs.
2. Consideration should be given to joint school-community park site acquisitions programs.
3. For school districts with stable or declining populations, the necessity of eventual consolidation must be faced when replacement becomes necessary.
4. Consolidation is the only way in which many communities can afford to provide the quality of education and the special programs needed to prepare our children for today's world.
5. High rate of seasonal employment, unemployed, retired, and welfare recipients has a major impact on the tax base.
6. A national sales tax or other federal plan is needed to relieve the local property taxpayers from the ever-increasing cost of education.
7. Develop or improve facilities for day-care.
8. Develop or support counseling programs.
9. Support or encourage development of museums, arts and crafts centers, historical sites, and points of interest.
10. Encourage the development of all types of outdoor environmental education programs for all age groups.
11. More vocational training should be offered for all age levels.

^{1/} Department of Commerce, 1970 Census

WELFARE

Housing

"The lack of home maintenance was aggravated by the fact that for years little construction took place in the area's housing market. Again this was influenced by an unstable economy. The consequence of this lack of building is today experienced as increased demand for most types of housing.

Other high demand, limited supply situations exist in the area of rental units of reasonable quality and also adequate housing for the low income and elderly.

A major problem hurting the housing picture of Pacific County is the relative cost of construction. It has been pointed out that an index on the cost of construction reveals that Pacific County is one of the highest in the state. This is influenced by the fact that few large builders are located in the county. It is felt that the many small builders are unable to take advantage of the labor saving innovations which large builders so often have access to. Since prices are necessarily driven up as a result of proportionately more hours devoted to hand labor, demand for construction is driven down.

A further complication affecting the housing situation is the quality of water supply and sewage disposal." 1/

The 1970 U.S. Census of Housing enumerated 31,130 housing units in the tri-county area.

An important shift in housing construction since the 1960 Census: Recreational homes constitute an increasingly larger share of new housing starts.

Statement of problems in Pacific County which may apply to the project area: 1/

1. Demand for housing from a large population dependent on a seasonal and fluctuating single industry economy has created a high turnover in the available construction of adequate quality of low and middle priced housing.
2. Further residential development without community water and sewer facilities will result in a serious contamination of the county's environmental resources. Such a condition, if allowed to go unchecked, will increase the attendant health and nuisance factors already evident over large areas of the county.
3. There is little availability of conventional money to finance housing for the middle income wage earner. This is, of course, a by-product of the national expenditure programs.

1/ Pacific County Regional Planning Commission, Pacific County Reconnaissance Element, June 1970.

4. Past subdivision activity conducted along the philosophy of least developmental cost - maximum number of lots has left the county with innumerable land parcels with no provisions for future community facilities, inadequate lot sizes, no consideration for density standards and little or no consideration for aesthetic amenities.
5. The strong demand for housing close to the population centers, coupled with the scarcity of housing in these centers, has created an inflated demand for housing in the rural areas. This demand is aggravated by advertising campaigns for secondary homes.
6. The State Highway Department's proposed improvements for the Raymond-South Bend area, is expected to displace an undetermined number of homes. As of this writing, there is no assurance that new construction will replace dwellings displaced by the highway improvements.
7. The age of the present housing supply is such that much of the existing housing has serious deficiencies, especially in the line of plumbing and electric wiring.
8. The profusion of recreational homes (part time or seasonally occupied) in part of the county, creates problems of maintenance and the provision of community services. (fire protection, police, sewage, water supply, etc.)
9. A high degree of turnover within the rental market, coupled with a lack of new rental construction, enables landlords of Pacific County to realize profits in low upkeep and deteriorating structures."

Fire protection

According to the Comprehensive Water and Sewer Plan for Grays Harbor County, "the need for fire protection is always a consideration in the construction of public water systems and people are probably more aware of this need today since homes and commercial properties are often purchased through mortgage loans with the buyer being required to insure the structures against fire. Fire insurance rates vary greatly depending on the degree of fire protection available. The National Board of Fire Underwriters (NBFU) is the agency responsible for establishing standards of fire protection for insurance purposes and has published a complex grading schedule for evaluating the fire protection capabilities in cities and rural areas based on the capabilities of the water system, the fire department and the fire alarm system. Insurance categories range from Class 10, unprotected, to an optimum grading of 1. The Washington Surveying and Rating Bureau in Seattle is responsible for grading water systems in the State of Washington.

Essentially all of the populated areas in Grays Harbor County are included in local fire districts and the incorporated cities have their own municipal fire departments. Generally, the fire protection districts and the fire departments are rated Class 8 or better for fire protection purposes. This means that private homes in a district that are located within 1,000 feet of a fire hydrant and less than five miles from a fire station can classify as Class 8. Private dwellings within two miles of fire station but not protected by a fire hydrant can classify as Class 8a. Farms within one and one-half mile of a fire station in a Class 8 district that are protected by a hydrant within 600 feet are rated Class

8 while those between one and one-half and three miles, protected by a hydrant, are rated Class 9. A fire district with a volunteer fire department and truck-mounted motor pumping equipment can usually classify as a Class 8 district. In order to achieve better than a Class 8 grading, a recognized water system becomes mandatory.

The cost of incorporating fire protection features into water systems and the expense of fire equipment is substantial, but often can be recovered through lower fire insurance premiums. Recent quotations of the three-year insurance premiums on a \$20,000 home for Class 10, 9, 8a and 8 gradings are \$271, \$199, \$133 and \$107, respectively."

The Preliminary Land Use Plan for Pacific County states that "fire protection in Pacific County is, for the most part, quite good considering the large geographic area and small population of the county. An excellent system of mutual aid between the various fire departments, the State Department of Natural Resources and the major timber companies is in effect.

The City of Raymond is the only agency besides the State Department of Natural Resources which has full-time paid firemen. The City of Raymond operates with three paid drivers and a crew of volunteers. The City has five trucks and an emergency rescue unit. The timber companies have some full-time employees devoted to fire patrol and dispatching during the summer forest fire season.

Volunteer fire departments are found in the cities of South Bend, Long Beach, and Ilwaco, and in rural fire protection districts at Chinook (F.D. No. 2), Willapa Valley (F.D. No. 3) with a station at Menlo and a truck at Raymond, Naselle (F.D. No. 4), North Cove (F.D. No. 5), Bay Center (F.D. No. 6) and Peninsula (F.D. No. 1) with stations at Ocean Park, Oysterville and Litschke Road. In addition there is a fire truck kept at the Brooklyn School. Brooklyn has no organized fire protection according to the Health, Education and Welfare Committee. Cathlamet has good fire protection according to the same committee.

Communications are one of the greatest problems facing the various fire agencies. The volunteer companies in the Peninsula area need to have a single phone manned around the clock.

Other Peninsula fire protection needs mentioned include improvements in water supply and distribution in Ocean Park and Seaview, construction of additional cross-Peninsula roads for better access, and construction of a larger station and meeting hall for the Peninsula Fire District No.1 at Ocean Park.

Fire protection for forest lands is well organized with a large amount of equipment and men available through the Department of Natural Resources and the timber companies.

Approximately 860 trained and equipped fire fighters are available within the Willapa District for work on forest fires. Available equipment includes 72 pump trucks, 47 water trailers and 78 dozers as well as a large number of chain saws, portable pumps, hose and the like.

While the primary job of the Department of Natural Resources and timber companies is control of forest fires, they will respond upon request of responsible agencies for any type of fire. This back up force provides for superior protection during fire season, but provides a lesser degree of back up protection in winter months when much of the forest fire equipment is winterized and not immediately available."

Police protection

The Law Enforcement Plan for Grays Harbor County has found that, "nine incorporated cities and towns in Grays Harbor County with populations from 300 to 20,000 each maintain a police department. The sheriff's office handles felonies in all but the two largest cities as well as in the entire unincorporated area other than the Quinault Reservation, which it enters only on invitation from the tribal authorities. All departments are understaffed. In round figures, there is one police/sheriff employee for every 1,000 of the resident population, or one for about every 2,500 of the transient population. The juvenile detention facility is very small. There are no resident rehabilitation facilities."

"Police protection in Pacific County, as determined by the Pacific County Preliminary Land Use Plan, as a whole may best be described as minimal. A total of 16 policemen (excluding state police, whose primary responsibility is traffic patrol of state highways) are available in the County. Of these, 11 are in the incorporated cities and 5 in the County Sheriff's office. These 16 men are expected to provide 24 hour patrol, provide criminal investigation services, serve civil processes, appear in court, maintain communications and jails, and generally keep the peace in an area which encompasses four incorporated cities and 925 square miles of rural area.

The Pacific County Sheriff feels that a doubling of present personnel to 32 is needed to maintain minimum standards of protection. Present levels of law enforcement are being maintained only through the use of resident policemen who live in their protection area and who essentially are on call 24 hours a day, seven days a week.

The current lack of an effective communications network is a problem, but construction of a new network is underway which will be of considerable help. The center will be in South Bend. There still remains a need for adequate personnel to man the new center round the clock. Also, it has been stated that radio communications from the Raymond-South Bend area to the Peninsula are often very weak.

The present city jails are unusable, due to a lack of continuous supervision and very outmoded construction. The existing Pacific County facility is utilized on a joint basis by the cities and county. It is also inadequate, however, and has been rated inadequate by State Authorities for the last 12 years. A bond issue for a new city-county jail facility was defeated several years ago.

In general, some road improvements are needed to increase circulation and eliminate dangerous, accident-prone locations. Specific mention was made of the need to improve dangerous curves on Highway 101 at the Grays Harbor County line, at the Bone River Bridge and at the Palix River Bridge. Better street lighting in urban areas and at major highway intersections is greatly needed both to reduce accidents and as a deterrent to crime."

A major crime problem in the project area is a result of the large number of seasonal or summer homes which are left unattended for long periods. These homes present a tempting target for burglary, trespass, and vandalism.

During the summer months in Pacific County the population is observed to jump 50,000 persons during any given weekend and averaging to 25,000 persons any given month. At the same time, the sheriff's staff remains the same.

"Additional police protection can be obtained at low cost through development of a non-paid volunteer reserve force which could provide patrol of residential areas and beaches and generally assist the professional policemen when needed. Such a reserve force, if adequately trained, can also serve as a much needed supplement to the regular force during the high population summer months.

Search and Rescue in Pacific County under the Civil Defense Administration has operated successfully for some time using a corps of volunteer workers. The Coast Guard handles search and rescue in the bays and on the ocean. Coast Guard helicopters from Astoria and Army helicopters from Fort Lewis are readily available to answer emergencies. A modern heliport has been constructed at the hospital in South Bend. Weyerhaeuser Company also maintains helistops at several locations in the woods and operates their own fleet of helicopters for both rescue functions and for supervision of logging operations." 1/

"Most of these law enforcement problems could be resolved by making the inadequate local tax dollar stretch by improving utilization of manpower - through mutual aid; through making professionals' time go farther by means of development of volunteer and auxiliary services; through upgrading personnel by means of in-service training; through sharing of technical services areawide. Second, with the cooperation of other agencies, instituting campaigns to cut down crimes of opportunity and to expand public cooperation." 2/

1/ Pacific County Regional Planning Commission, Preliminary Land Use Plan for Pacific County, July 1971.

2/ Grays Harbor Regional Planning Commission, Law Enforcement Plan for Grays Harbor County, September 30, 1970.

Elderly

Our senior citizens are so often the neglected members of our society as is evident in the lack of housing, medical care, community involvement and just plain old love and attention they receive.

Today's hectic pace, mobility and loss of roots may be the cause or the excuse. If everyone were to stop and realize that they too will be entering the ranks of the neglected elderly possibly attitudes would change: "Time to no one man shows partiality" - O. W. Holmes.

Why not adopt an extra set of "parents" or grandparents?

FISH is one of the few volunteer groups that is attempting to meet the needs of the elderly. It is a voluntary program staffed by local people who have services to render for aiding the elderly. The volunteers have a telephone file that contains names of groups, organizations, and individuals who can provide specific assistance and services. Each volunteer is scheduled to serve a specific number of days per month. Volunteers are on call 24 hours a day. Most calls are for transportation, food and clothing.

Recommendations made by old people recently contacted: social security payments geared to the cost-of-living index; old-age housing with rooms so laid out that they can take their own belongings there; more and better "extended health-care" nursing homes; more home help; more ambulance service.

Minorities

Minorities represent 2.8 percent of the total project population. Indians make up 76 percent of the minority group. 86 percent of the total minority population reside in Grays Harbor County (see Table 18).

TABLE 18. DISTRIBUTION MINORITY POPULATION ^{1/}

County	Total Population	White	Negro and Other
Grays Harbor	59,553	57,658	1,895
Pacific	15,796	15,530	266
Wahkiakum	3,592	3,535	57
Total	78,941	76,723	2,218

^{1/} Adapted from: Department of Commerce, Bureau of Census, 1970.

Opportunities, needs, problems

In addition to the opportunities, needs, and problems discussed above local people serving on resource committees have identified the following:

1. Develop new or support existing facilities for juvenile problems, and alcohol and drug abuse.
2. Develop training and educational programs to relieve unemployment and encourage industrial growth.
3. Assist all communities in the project area to identify their needs and assist them in determining their course of action.



INDUSTRY, COMMERCE AND TRANSPORTATION

Japanese ship loading logs at the Port of Willapa Harbor, Raymond.

KEN BAILE PHOTO



INDUSTRY, COMMERCE, TRANSPORTATION CONTENTS

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INDUSTRY

Economy

"The economy of Washington's South Coast counties is largely based on the region's two major resources, timber and the ocean. Lumbering and fishing were the pursuits which originally drew settlers to the area in the mid 1800's and were responsible for the most rapid period of growth in the region at about the turn of the century. Tourist and recreation activity has had a strong influence on the South Coast economy throughout most of its history. Agriculture, primarily dairy farming and cranberry production, has also been important.

The forest products industry - comprised of logging, lumber, pulp, paper, shingles, shakes and plywood - accounts for nearly 30 percent of the total employment in the area (see Forestry section). Although the industry is widely diversified, the major market is residential construction. Consequently the region has experienced fluctuations in activity levels, generally paralleling the rate of national housing starts. Pulp and paper, and more recently log and forest products exports, have been stabilizing forces.

The Pacific Ocean, with its beaches, excellent offshore salmon fishing and sheltered harbors, has been a major tourist attraction since the early 1870's. Improvements in access over the years have helped promote continued expansion in the recreational use of the region, and tourism continues to increase in importance to the regional economy as a source of income and employment. Commercial developments have expanded, keeping pace with the increasing number of visitors, and offer activities to satisfy a diversity of interests.

Employment growth in the South Coast Region has not kept pace with the state's rate of expansion. Total employment in forest products manufacturing has remained fairly stable recently with expansion in logging and pulp and paper offsetting declines in lumber and wood products. The primary source of employment gains has been in non-manufacturing. These gains are particularly in services and trade.

Wages and salaries from manufacturing, primarily forest products, is the principal source of income.

Important recent developments affecting the South Coast economy include: Continued growth in recreational developments characterized by rapid expansion in condominium complexes, motels, convention facilities, and scores of second homes; and the Wynoochee Dam project which upon completion will provide large quantities of water to the Grays Harbor area cities of Aberdeen, Hoquiam, and Cosmopolis.

In terms of future growth potential, the region offers unspoiled environment, open space and available labor - all located midway between the two major metropolitan centers of Seattle and Portland. Continued

expansion in tourist-recreational developments ^{1/}is assured and will be the source of much of the region's growth."

Manufacturing

"In mid-1971 there were 247 manufacturing establishments in Grays Harbor County, about 67 in Pacific County and 27 in Wahkiakum County for a total of about 341 establishments in the project area." ^{2/}

The principal products are: lumber, plywood, veneer, shingles, shakes, pulp, paper, furniture and cabinets, cranberry products, seafood products, and pulp and paper making machinery (see Industries Location map following page 88).

Industrial sites

The following types of sites are available: Zoned, Planned Industrial Parks, Rail, River Frontage, Deep Water Frontage, Airport, and Highway. Terrain is flat, subsoil is silt or hydraulic fill and piling is required. Single tracts are available up to 2,500 acres ranging from \$300 to \$5,000 per acre. Sites owned by the counties and ports are available on long term lease or can be purchased at very low cost.

There is a need for a complete industrial site survey in Pacific and Wahkiakum Counties.

Sources for industrial financing

Grays Harbor Development Corporation, banks, Small Business Association and revenue bonds through Port of Grays Harbor and Willapa Harbor Industrial Development Association are sources for industrial financing. Ports now have the capability to finance pollution control facilities.

Employment

"Employment in non-manufacturing concerns has shown steady growth over the 10-year period. Manufacturing employment has shown an increase in Pacific and Wahkiakum Counties, but has declined in Grays Harbor County. The categories of 'All Other Nonagriculture' ^{3/}and 'Agriculture' show negative growth for all three counties."

^{1/} Washington State Department of Commerce and Economic Development, South Coast Region, 1971.

^{2/} State Department of Employment Security, Quarterly Reports, Second Quarter, 1971.

^{3/} State of Washington, Employment Security Department.

TABLE 19. WORK FORCE REPORT BY COUNTY (AVERAGE ANNUAL)

Item	Grays Harbor ^{1/}		Pacific ^{1/}		Wahkiakum ^{2/}	
	1960	1970	1960	1970	1960	1970
Civilian Work Force	21,680	23,960	6,060	6,470	1,350	1,425
Unemployment ^{3/}	1,900	2,470	600	490	55	60
Rate ^{3/}	8.8	10.3	9.9	7.6	4.0	4.1
Employment Total	19,780	21,440	5,460	5,980	1,295	1,365
Employment by Industry						
Manufacturing	7,380	6,840	1,720	1,850	465	520
Non-manufacturing	8,150	11,350	2,020	2,740	225	275
All Other						
Non-agriculture	3,430	2,640	1,150	930	215	200
Agriculture	820	610	570	460	390	370
Labor Management Dispute	0	0	0	0	0	0

^{1/} Figures supplied by State of Washington, Employment Department

^{2/} Estimated

^{3/} Includes all unemployment

TABLE 20. INDUSTRIAL WAGE RATES

	Male	Female
Skilled Personnel	\$3.71 to \$5.50	\$3.71 to \$5.50
Semi-skilled Personnel	3.00 to 3.75	1.60 to 3.50
Unskilled Personnel	2.50 to 3.00	1.60 to 3.00
Clerical Personnel	2.50 to 4.00	1.60 to 3.00

The dominant unions are: AFL-CIO, IWA Woodworkers, Plywood and Veneer Workers, Teamsters, Association of Western Pulp and Papermakers, Shoal-water Bay Oyster Workers Union #14 (AFL-CIO), Shingle Weavers #2542 (AFL-CIO).

Income

In 1970, median family income in the project area was considerably lower than the state as a whole. The State of Washington has a median family income of \$10,407 as compared to Grays Harbor \$9,220 Pacific \$8,575 and Wahkiakum \$9,098.

The distribution of families by levels of income for the three counties and the State of Washington is shown in Table 21.

TABLE 21. DISTRIBUTION OF FAMILY INCOME FOR PROJECT AREA & STATE ¹/

Family Income	Grays Harbor County (numbers)	Pacific County (numbers)	Wahkiakum County (numbers)	State of Washington (numbers)
Less than \$1,000	297	59	17	15,950
1,000 - 1,999	476	169	35	20,564
2,000 - 2,999	873	271	38	32,699
3,000 - 3,999	787	303	57	36,406
4,000 - 4,999	751	296	56	37,012
5,000 - 5,999	845	314	47	40,001
6,000 - 6,999	1,047	249	45	45,972
7,000 - 7,999	1,196	275	80	54,554
8,000 - 8,999	1,256	422	83	61,201
9,000 - 9,999	1,145	310	51	61,750
10,000 -11,999	2,175	551	172	123,735
12,000 -14,999	2,363	469	106	136,011
15,000 -24,999	1,938	546	119	157,693
25,000 -49,999	341	123	9	33,350
50,000 +	70	--	11	5,644
All Families (total)	15,560	4,357	926	862,542
Median Income	\$ 9,220	\$ 8,575	\$ 9,098	\$ 10,407
Mean Income	\$ 9,985	\$ 9,412	\$10,214	\$ 11,511

Utilities

Telephone: Cohasset Beach Telephone Company
 Ilwaco Telephone Company
 Pacific Northwest Bell
 Western Wahkiakum County Telephone Company

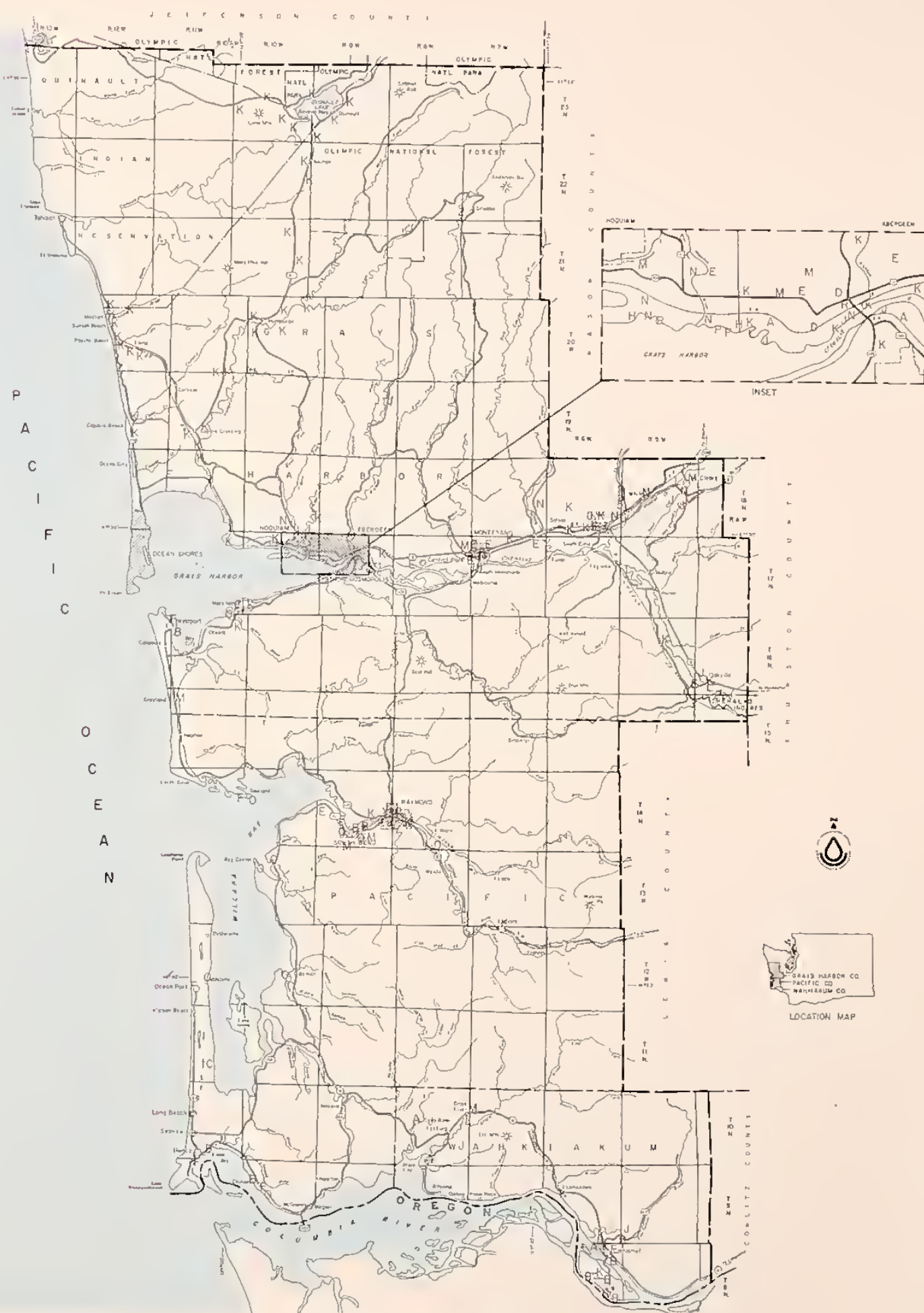
Electric: Public Utility District #1 of Grays Harbor County
 Public Utility District #2 of Pacific County
 Public Utility District #1 of Wahkiakum County

Natural Gas: Cascade Natural Gas Corporation

¹/ Adapted from: 1970 Census Tables 57 and 124, Department of Commerce

RESOURCE INDUSTRIES LEGEND

A	Log Dumps and Sorting Yards	K	Shake and Shingle Mills
B	Boat Builders	L	Plywood and Veneer Mills
C	Cranberry Processing	M	Minor Forest Products (cascora, ferns, salal, canes)
D	Dairy Product Processing	N	Special Wood Products
E	Slaughter Houses, Meat Processing	O	Shellfish Processing (oysters)
F	Fish Processing	P	Pulp and Paper Plants
H	Sawmills Hardwood	R	Pallet Manufacturing
J	Sawmills Softwood		



GENERAL RESOURCE INDUSTRIES LOCATION MAP
COLUMBIA-PACIFIC
RESOURCE CONSERVATION & DEVELOPMENT PROJECT
GRAYS HARBOR, PACIFIC AND WAHIAKUM COUNTIES, WASHINGTON

MAY 1972

SCALE 1:500,000



COMMERCE

Total commerce in Grays Harbor, over that of 1969, continues to climb. Total tons handled in 1970 were 2,727,094 compared to 1,329,355 in 1965 and 595,964 in 1960. An approximate doubling of cargo tonnage for each 5-year period.

Number of vessels

An interesting sidelight to tonnage comparisons is a comparison of the number of vessels used to carry the cargo. In 1960, 224 vessels called at Grays Harbor, increasing to 250 in 1965 and to 294 in 1970. Thus, a 12 percent increase in vessels doubled the tonnage between 1960 and 1965, and an 18 percent increase in vessels carried a 100 percent increase from 1965 to 1970.

Each year we see larger vessels loaded to deeper drafts. Forecasts indicate this trend will continue with a jump within two years to vessels about 600 feet long, drawing 35 feet when loaded.

In addition to wood products, it may be of interest to note the domestic seafood receipts and foreign oyster seed imports of Willapa Harbor (see Tables 22 and 23).

TABLE 22. PORT OF WILLAPA HARBOR

December 31, 1970

Port Trade (Short Tons)	Foreign		Domestic	
	Import	Export	Receipts	Shipments
Seafood			909	
Oyster Seed	812			
Lumber				40,120
Inland Movements				3,389
All Other - Logs		221,177		
Total	812	221,177	909	43,509

TABLE 23. PORT OF GRAYS HARBOR - WATERBORNE FOREIGN & DOMESTIC COMMERCE1970 - ENTIRE HARBOR

(In Tons of 2,000#)

	Logs Brereton F.B.M.	Lumber F.B.M.	Lumber & Logs Tons	General Cargo Tons	Petroleum Products Tons	Total Tons
<u>Imports</u>						
Coastwise				1,951	193,905	195,856
Europe				386		386
Totals				2,337	193,905	196,242
<u>Exports</u>						
Coastwise		17,670,427	30,029		724	31,644
Orient	675,835,377	134,107	2,516,374	18,883		2,535,257
Europe				21,347		21,347
East Coast		13,074,782	22,882			22,882
South America				17,679		17,679
India				5,897		5,897
Australia				1,172		1,172
Mediterranean				9,283		9,283
Totals	675,835,377	30,879,316	2,570,176	74,261	724	2,645,161
Total Imports & Exports	675,835,377	30,879,316	2,570,176	76,598	194,629	2,841,403

Dredging

"Annual maintenance dredging in Willapa Harbor increases the natural bar channel depth to the authorized 26 feet; however, this depth is seldom attained for the authorized width of the channel or for its entire length because of fund limitations and the limited time hopper dredges are available. Annual maintenance dredging usually is completed in July or August, but the channel begins to shoal to its natural depths during the first winter storms, usually in November. Depths of the Willapa River Channel vary from 20 to 24 feet between periods of annual maintenance dredging.

Log and lumber ships now using Willapa Harbor have fully loaded drafts of 28 to 33 feet. Inadequate depths and the shifting nature of the outer bar channel, as well as restrictive depths of the interior navigation channels, place Willapa Bay at a disadvantage with other West Coast ports. Ships are restricted to 20-foot drafts, which they reach with about one-third of a load. Ships must then stop-off at another

port before sailing to their destination, at the added cost of the second port-of-call. In addition, sailings are restricted to daylight hours, and many vessels which finish loading late in the day must wait until the next day before pilots will guide them across the bar." 1/

According to the Port of Grays Harbor, Annual Report for 1970, "In 172 dredging days, the Robert Gray pumped 1,089,930 cubic yards from the channel and pier areas in Grays Harbor. Average costs showed a sharp increase to fifty-two cents (52¢) per cubic yard. Approximately the same yardage was dredged in 1968 at a cost of thirty-eight cents (38¢) which costs were substantially above the 45-year average of fourteen cents (14¢).

These drastic increases in cost are of deep concern, and require a complete analysis of the operation of the Robert Gray and of the total dredging picture. The Port and the U.S. Army, Corps of Engineers, are working hard on the problems of cost, environmental protection and channel configuration. Hopefully some new direction will be forthcoming in the near future."

Commercial fishing vessels 1/

Charter boats, towboats, recreational, and other small craft have little difficulty with Willapa Bar channel depths. However, the shifting nature of the bar channel, the strong channel currents, and turbulence created by storm waves breaking over shoals in the harbor entrance and over the bar make passage hazardous, and severely restrict expansion of the number of boats based at Willapa Bay. In contrast, the number of boats based at Ilwaco to the south and Westport to the north, where harbor entrances were protected, expanded phenomenally in recent years. Boats based at Ilwaco and Westport spend much of their time fishing in the ocean adjacent to Willapa Bay, which is a prime sport fishing area.

Small boat moorage demand 2/

The small boat moorage demand originates from three sources: commercial fishing boats, charter boats, and pleasure boats. For each classification, demand may be sub-divided into permanent, seasonal, temporary, and port-of-refuge. The Port of Grays Harbor (Westport Fishing Base) primarily provides permanent moorage and at a very low rate in comparison with other ports. Excess demand exists - over 90 owners are on a

1/ Seattle District, U.S. Army Corps of Engineers, Public Information Bulletin, Feasibility Study - Navigation and Beach Erosion, Willapa River and Harbor and Naselle River, Washington, January 1972.

2/ Engineering and Management Sciences Corporation with Greenacres, Inc. and Swan Wooster Engineering Incorporated, Port of Grays Harbor Comprehensive Development Plan - Phase I - Demand and Capacity Analysis for Water Transportation Oriented Facilities, July 1970.

waiting list for moorage. The 1969 Westport Fishing Base moorage list contains 266 commercial boats, 167 charter boats, and 89 pleasure craft. The Port of Willapa moored 13 fishing boats and 55 pleasure boats.

Canal

The Preliminary Land Use Plan for Pacific County has found that "the Canal Commission and Army Corps of Engineers have been charged with investigation into the needs for and feasibility of a ship or barge canal linking the Columbia River with Puget Sound. One route which has been investigated is a canal through the base of the Long Beach Peninsula, thence north via Shoalwater Bay and Willapa Harbor through North Cove and Grayland to a connection with Grays Harbor. A barge canal would then link Grays Harbor with Puget Sound via the Chehalis River-Black Lake basins.

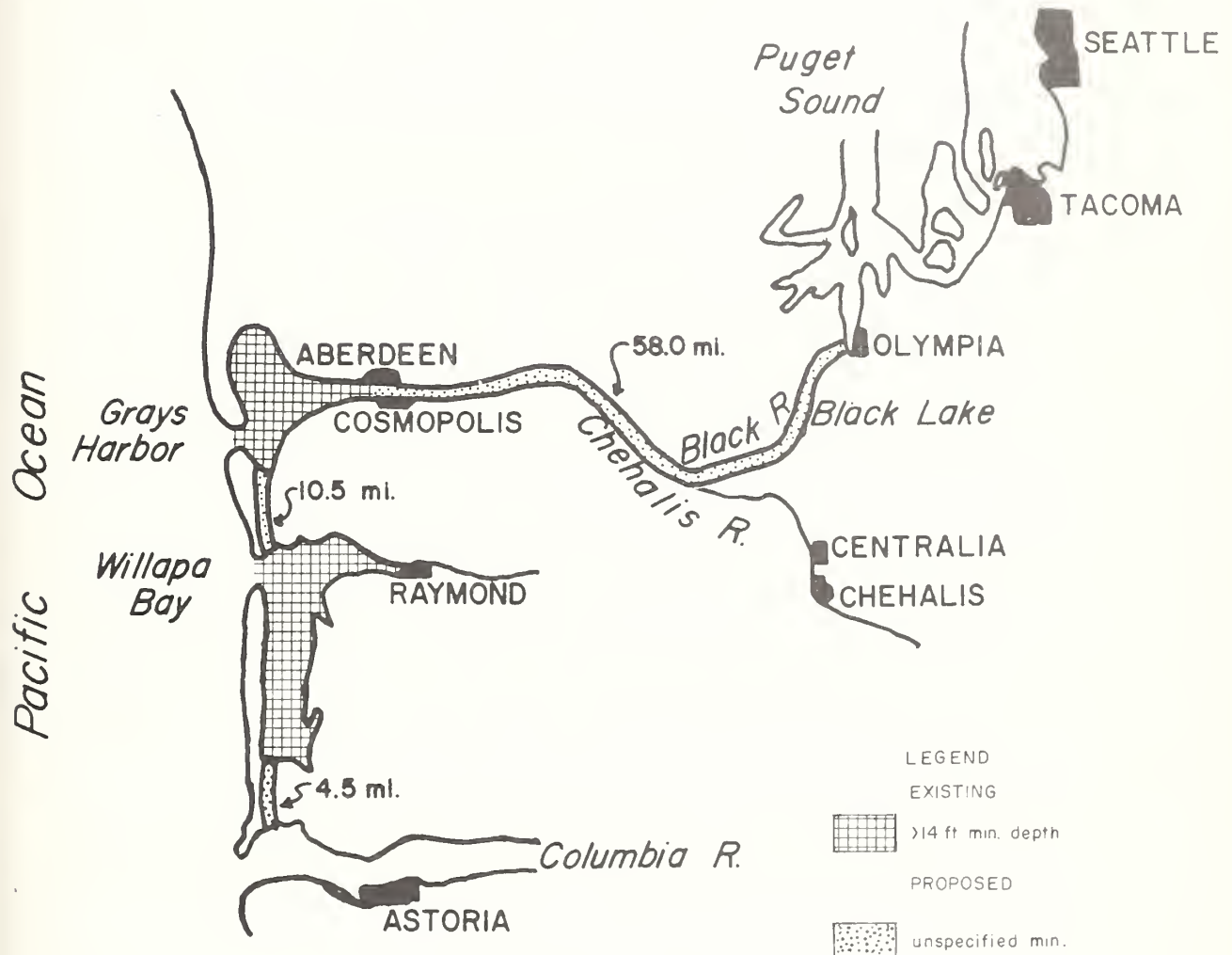
Preliminary cost estimates and benefits of the most feasible route were determined in 1967. Segments of the canal which provided deep draft navigation from the Columbia River to Willapa Bay were found to have the greatest economic potential, but costs still exceeded projected benefits.

The implications of such a canal and its impact on the economy and ecology of the area are vast and extremely difficult to predict. Possible benefits of the canal might include improvement of the position of the Port of Willapa as a major shipping port through elimination of channel maintenance restrictions on the size of vessels which can enter the harbor. Elimination of channel maintenance at the Willapa Bar could also result in the saving of many dollars each year. The elimination of channel maintenance might also have beneficial effects upon the tokeland erosion problems. The construction and operation of the canal would bring considerable money into the community and development might also bring a sizable increase in recreational boating and tourism in Willapa Bay."

"In 1967, the Portland industrial consultant Ivan Block drew public attention to the fact that the Northwest is running out of waterfront industrial sites rather fast, and that Grays Harbor has an enormous asset in its possession of 5,000 acres of such sites. There is even the potential of more, because if the Southwest Washington Intracoastal Waterway is built, the Port of Grays Harbor plans to use the dredge spoil to construct more large sites." 1/

1/ Over-all Economic Development Program for Grays Harbor, Washington, 1969.

PROPOSED INTRACOASTAL WATERWAY PUGET SOUND TO COLUMBIA RIVER



SOURCE: U.S. GEOLOGICAL SURVEY: DEPT. OF CONSERVATION

Conclusions

The principal conclusions derived from the Grays Harbor Over-All Economic Development Program are:

- A. The Grays Harbor estuary is expected to experience significant and accelerated industrial development during the planning period for the following reasons:
 - 1. Accelerated population growth in Puget Sound
 - 2. Projected exhaustion, by 1985, of the supply of available Puget Sound industrial land accessible to navigable water
 - 3. Availability of large blocks of industrial land in Grays Harbor possessing:
 - a. Access to navigable water
 - b. A large, uncommitted supply of industrial water available in 1973 from the Wynoochee Dam project
- B. The forest lands tributary to Grays Harbor contain excessive stocks of old timber. The yield of the lands will increase significantly if accelerated cutting of these stocks takes place. This provides a supply considerably larger than domestic demand. The difference between supply and domestic demand will be exported as logs or chips.
- C. Because of the expected increase in log exports, a new log export facility is now under construction.
- D. An expansion of pulp exporting facility will be required before 1990.
- E. The supply of small boat moorages is critically short and a three-fold expansion of present facilities will be needed before 1980.
- F. Airport realignment or relocation can increase the amount of potential industrial land available on the north side of the estuary.
- G. There should not be a shortage of land accessible to shallow water during the planning period. However, open land with water navigation access will be exhausted by the end of the period.
- H. There is a continuing trend toward larger ships. Specifically, the new class of chip ships will have a draft of 36.2 feet. The Grays Harbor channel depth is 30 feet. Also, the channel is narrow, making it difficult and dangerous to navigate. Thus, the chip export will not reach full economic potential without a deeper and wider channel.
- I. Industrial development of the estuary required the continuence of the low cost, electrical power rate and an adequate supply of power.
- J. Continuing exploratory drilling for off-shore oil indicates the probable existance of oil along the coast of Grays Harbor. The oil companies will not comment on the results. It is expected that during the planning period there will be commercial development of these finds. Impact on the Port will be through the need for terminal facilities to ship supplies, machinery, and drilling mud, the provision of on-shore oil storage facilities and - depending on the company finding the oil - provision of a refinery site.

TRANSPORTATION

Rail: Freight and cargo in the area is handled by Milwaukee; Burlington Northern; and Union Pacific railroads. There is no rail passenger service available.

Air: Bowerman Field in the Aberdeen-Hoquiam area is connected to Seattle and Portland by four scheduled flights daily with Hughes Air West. Charter air flights are available on request. Airports for small planes are located in Aberdeen, Westport, Elma, Raymond-South Bend, Long Beach-Ilwaco. There is no airport in Wahkiakum County.

Bus: Washington Coast Lines has bus service four times daily between Olympia and Hoquiam and intermediate cities along the way. Except for bus service on the Kelso-Ocean Beach Stagelines Company from Kelso to Long Beach and Ocean Park, there is no available public transportation which services the towns and cities of Pacific County. The Long Beach Community Development Survey asked the following question with indicated response:

Satisfied with bus service to:

	<u>Yes</u>	<u>No</u>	<u>Don't Know</u>	<u>No Response</u>
Astoria?	77	727	57	103
Raymond?	141	484	67	162
Grays Harbor Area?	82	401	67	159
Longview?	550	258	63	74

"The construction of the Astoria Bridge opens the possibility of bus connections from Seattle and Portland via Aberdeen and Astoria. Such a route could easily be integrated into the existing Peninsula-Kelso connection and would add an important north-south link through the project area." 1/

Taxi: Taxi and ambulance service is available in the larger urban areas and some beach resorts.

Truck: Numerous truck lines provide freight service throughout the area-Garrett Freight Lines, United Buckingham, Oregon-Nevada-California, Puget Sound Freight Lines, Olympic Transportation, and United Parcel Service.

Ferry: "The Columbia River Ferry has been travelling between Puget Island and Oregon since 1962. This vessel, 69 feet in length, can carry twelve vehicles. In 1968 it carried about 10,754 autos; 1,164 trucks; 7,394 commuters for a total traffic volume of 19,312. This was steadily increasing each year as indicated by the 1965-1968 figures." 2/

The Aberdeen Daily World, dated May 5, 1972, in its "Harbor Ferry Study Starts" article states that: "After a brief study of a ferry system between Westport and Ocean Shores in 1970 the state highway department said a 65-car ferry to provide service for projected 1990 traffic on

1/ Pacific County Regional Planning Commission, Preliminary Land Use Plan for Pacific County, July 1971.

2/ M.G. Poole and Associates, Cathlamet Comprehensive Plan, 1969.

a 365-day per year basis would result in an annual deficit of \$500,000.

A 40-car ferry operating all year on the same basis would lose \$450,000 a year and the same ferry operating only at peak summer months would lose \$150,000 a year, the state said in 1970.

But at the urging of local residents and legislators the state decided to study the matter further, covering all alternatives."

Bridges: Many bridges throughout the project area on county and state highways provide vital transportation links. Bridges are one of the factors which increase the cost of road construction and maintenance.

The bridge that has caused the greatest impact on the project area and affects future transportation and tourism trends is the beautiful Astoria-Megler crossing of the Columbia River. The total number of crossings during 1971 was 515,924 cars.

Existing highways: Highways form the most important mode of transportation within the project area and to outside areas.

The most important north-south traffic corridor is U.S. 101. It is also a most beautiful scenic route extending from the Astoria bridge at the south end of our project to Queets at the north end. From Queets (see Base map preceding page 18) Highway 101 circles the fabulous Olympic Peninsula.

Highway 12 a four lane arterial connects Aberdeen with Elma; Highway 8 to Mud Bay and Highway 101 to Olympia.

State route 12 connects Elma with Interstate Highway 5 south to Portland.

Highway 105 is a scenic loop which connects Aberdeen-Cosmopolis with Raymond. 1,054,630 one-way trips through Westport were recorded in 1971.

State Route 4 connects the Long Beach-Naselle area and Cathlamet to Kelso and Interstate Highway south. This is a slow but most scenic route along the Columbia River.

Other State and county roads complete the transportation network.

Proposed highways: Most planned construction is for improvements of existing highways (see Highway Improvement map following page 96).

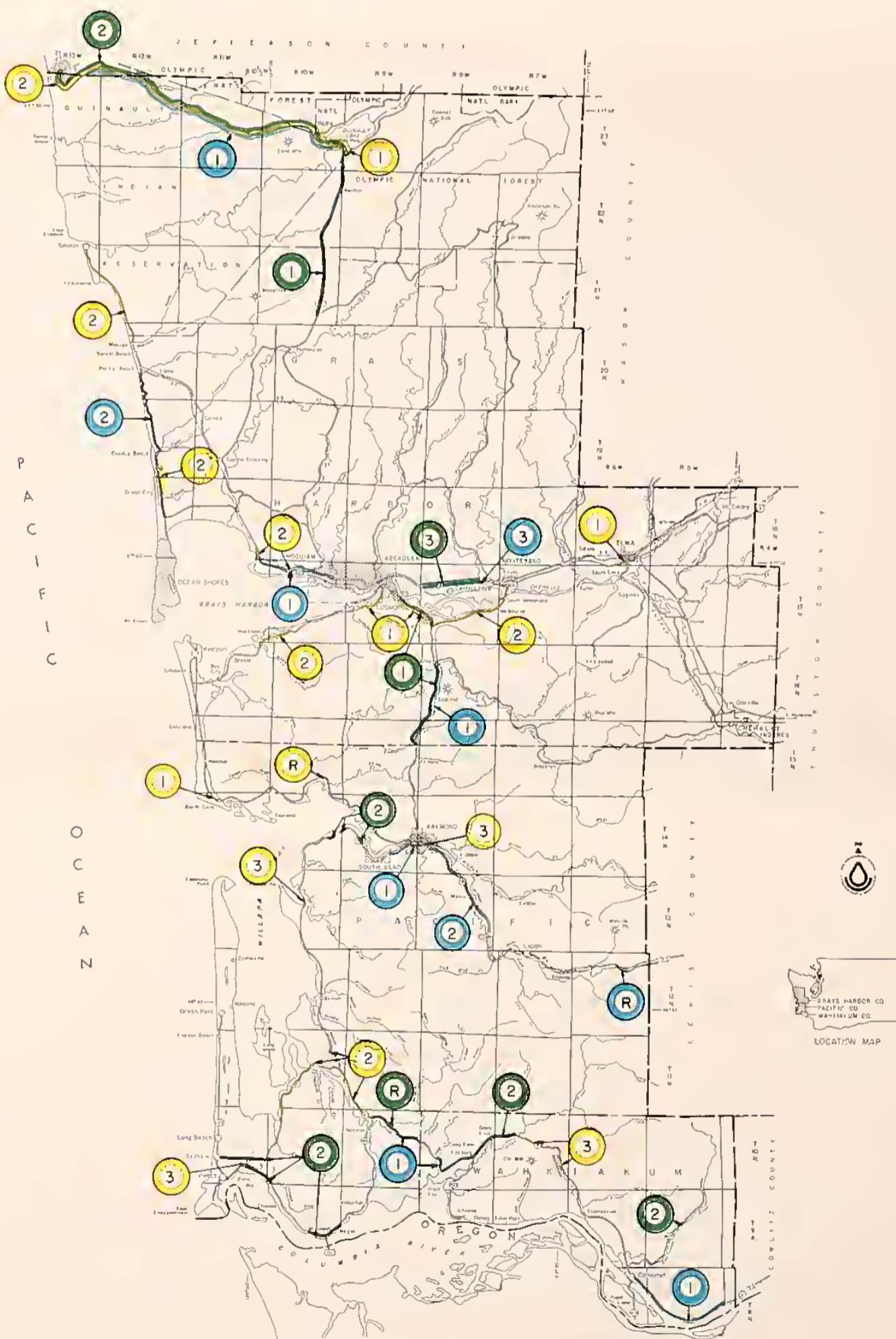
Some new routes are proposed by local people. One example is the Knappa-ton-Skamokawa water level route along the Columbia River. The Washington State Department of Highways made a reconnaissance survey of this route in 1970. This survey concluded that the route is not feasible due to excessive cost, low demand both present and potential, possibilities of disruption of the ecology of the north shore of the Columbia River, and extreme foundation problems, and geologic instability (slides) in and around Grays Bay.

LEGEND

- Indicated projects are planned for 1971-1973
- Indicated projects are planned for 1973-1975
- Indicated projects are planned for 1975-1977

- 1 Major Construction
- 2 Reconditioning and Resurface
- 3 Safety Improvement
- R Rest Areas

COURTESY OF: State of Washington,
Department of Highways.



PROPOSED HIGHWAY IMPROVEMENT
COLUMBIA - PACIFIC
RESOURCE CONSERVATION & DEVELOPMENT PROJECT
GRAYS HARBOR, PACIFIC AND WAHIAKUM COUNTIES, WASHINGTON

FEBRUARY 1972

Scale 1:50,000

One route strongly urged by some groups is the Grays River-PeEll connector which would facilitate Seattle-Tacoma-Olympia access to the Long Beach-Astoria area. This is under study by the State Highway Department.

The State Highway Commission has approved a reconnaissance engineering study of a traffic by-pass of the Aberdeen-Hoquiam area.

The Hoquiam to Grass Creek roadway is in the six year State Highway plan.

COMMUNICATIONS

Radio

The following radio stations originate in the project area:

<u>Location</u>	<u>Call Letters</u>	<u>Frequency</u>	<u>Kilowatt Power</u>	<u>Type</u>
Aberdeen	KBKW	1450	1 KW-D	AM
Aberdeen	KXRO	1320	5 KW-D	AM
Hoquiam	KGHO	1560	1 KW-D	AM
Hoquiam	KGHO	103.9 mhz	2.6 KW-D	FM
Ocean Shores	KDUX	104.7 mhz	25 KW-D	FM
Raymond	KAPA	1340	1 KW-D	AM

Television

The following educational closed circuit television is found in the project area:

Aberdeen School District #5
Channel 6 TV (Donn J. Moyer Productions, Ltd.)
Elma Elementary School
Elma High School
Grays Harbor College, Aberdeen
Hoquiam School District
Lake Quinault School District
Naselle High School
Raymond High School

Newspapers

The following newspapers are published in the project area:

<u>Name</u>	<u>Location</u>
Chinook Observer	Long Beach
Daily World	Aberdeen
Harbor Pilot-South Bend Journal	South Bend
Ocean Observer	Ocean Shores

<u>Name</u>	<u>Location</u>
The Chronicle	Elma
The Tribune	Ilwaco
Twin Harbors Press	Grayland
Vidette	Montesano
Wahkiakum County Eagle	Cathlamet

In addition the following outside newspapers have considerable circulation in the project area:

<u>Name</u>	<u>Location</u>
Daily News	Longview
Oregonian	Portland
Post-Intelligencer	Seattle
Times	Seattle

Opportunities, needs, problems

The only additions by local resource committees to the opportunities, needs, and problems previously discussed in this section are the following:

1. Improvement of public transportation systems in the project area.
2. Bus service is scarce and improvement is needed.

LAND USE

Reserve the flood plains for open space, agriculture, recreation, wildlife and other compatible uses as in this aerial view of South Montesano.

PH 1 T 9-4586 -



LAND USE CONTENTS

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LAND USE

Forest land is confined to the rough, hilly land of the project and is the predominant use of the land area. Agriculture, ranked second in land use, is confined to the flat, gently sloping areas in the stream valleys. (see General Land Use map following page 106)

About 92 percent of the land area is used for commercial and noncommercial forest production. Other important land uses include agriculture, 5 percent, urban and built-up, 2 percent, and all other uses 1 percent (see Table 24).

TABLE 24. LAND USE BY COUNTY (1968 FIGURES) ^{1/}

(In acres)

<u>Land Use</u>	<u>Grays Harbor</u>	<u>Pacific</u>	<u>Wahkiakum</u>
Agriculture	45,508	36,815	18,356
Forest Land	1,130,230	523,934	142,526
Urban & built-up	23,075	11,761	2,657
Other Land	17,187	7,220	2,081
Small Water Areas	6,270	1,520	1,230
Total	1,222,270	581,250	166,850

Land use trends

The Comprehensive Water and Sewer Plan for Grays Harbor County states that "in Grays Harbor County the most significant changes in land use are projected to occur in two areas. First, the area along the North and South Beaches is projected to be extremely developed for recreational use. Second, gradual urbanization of the areas surrounding Hoquiam, Aberdeen, and east towards Montesano is projected."

"Housing developments and summer homes are invading timbered and agricultural areas in increasing numbers. In the absence of proper planning there have been numerous instances of problems arising concerning pollution of water supplies, inadequate sewage treatment and waste disposal systems, incompatibility of agriculture and housing developments, highway locations and involuntary conversion of prime woodland to other-use in power transmission and pipe-line rights-of-way." ^{2/}

^{1/} From Conservation Needs Inventory, U.S. Department of Agriculture, Soil Conservation Service, 1967.

^{2/} Grays Harbor Soil and Water Conservation District, Resource Conservation Program, 1965.

"The population pattern and land use pattern can be discussed together very simply because they are all determined by the topography of the region.

The northern part and the southern part of Grays Harbor County each consist of forested mountains, divided by a narrow central band of lowlands running clear across the county from east to west. This band of lowland forks to go around both sides of the harbor, and extends along the ocean front north and south as a very narrow coastal plain.

This Y-shaped narrow band is the area of population concentration - 90 percent of the county's population is in this Y. All the cities and towns are in this Y. Half the county's population is in the three continuous cities at the head of the harbor.

The land-use pattern is the expression of topography plus population plus transportation.

Urban uses occupy the waterfront lowlands. Year-round recreational uses occupy the beaches. Agricultural uses are found in irregular patches (where the soil is suitable) filling in the rest of the Y and running a little way up into the tributary valleys. All the rest is forest." 1/

"Relatively few land-use regulations have been adopted by the legislative body of Pacific County. Consequently, the stability or turnover of land uses are unpredictable in the face of economic pressures to convert existing land uses. Such pressures are particularly acute in the vicinity of Willapa Bay and the Long Beach Peninsula. Traditional open space and farm lands that sit adjacent to the county's water bodies are today being developed into high density recreational developments.

The City of Raymond has been zoned for over twenty years and the Long Beach peninsula is afforded some protection by a weak interim zoning ordinance. The rest of the county, although not zoned, is moving in this direction. The consequences of so few land use controls are particularly apparent in the more built-up population centers. The North Pacific County for example, has several locations where mixed and incompatible land uses have been allowed to develop. Heavy industrial storage facilities are surrounded by residential dwelling units. There are also numerous examples of activities oriented toward a transient population being developed in established residential neighborhoods. The South Pacific County on the other hand exhibits land use patterns developed largely since the tourist industry realized broad scale profits.

The remaining land outside timber production is as noted, highly subject to a rapid turnover of land usage. A considerable problem associated with this condition is the simple fact that high costs are associated with proper development of alternative land uses. Large areas of Pacific County have environmental conditions which affect construction

1/ Over-All Economic Development Program for Grays Harbor, Washington, 1969.

standards adversely. Moderate to steep slopes, clay subsoils, high water tables and heavy rainfall are only a few of the parameters that must be calculated into construction costs.

Since physical development is related to Pacific County's resources to support such development, it is at the present, unlikely that wide scale land use changes will occur. Limited transportation routes, inadequate water supplies and a shortage of housing supply are only a few shortcomings inherent in Pacific County's resource base. Only a great deal of coordination and careful resource management will be likely to alter this situation." 1/

The Cathlamet Comprehensive Plan states:"the land use pattern is somewhat modified by the widespread and scattered pattern of rural residential land use which has developed along roads and highways throughout Wahkiakum County. With the exception of Cathlamet and Puget and Little Islands, residential development is not yet sufficiently dense to be the dominant land use. However, there is a trend toward greater densities of rural residential development with more of a tendency to cluster around the Town of Cathlamet and or Puget and Little Islands. Residential development has declined in the western portion of Wahkiakum County while increasing in the eastern portion.

A major portion of the development of Puget and Little Islands is water oriented, either fronting on the Columbia or on the major sloughs which drain the islands."

"Bernie Slough separates Puget and Little Islands. Moderately dense residential development lines its banks. Welcome Slough drains the central portion of Puget Island and empties into the Wauna Channel. Residential development along both sides of the slough has reached a rather high density.

Residential development is moving northward from the Cathlamet town limits and onto the benches north of State Highway 4 overlooking the town and the Columbia River. However, development fronting on the highway has thus far been a scattering of single homes. A considerable amount of level or gently-sloping land remains between the highway and Cathlamet. Because of its location close to municipal services, a high density of development may be expected in the future." 2/

Shoreline erosion 3/

The ocean is eroding about 3 miles of the beach and undermining upland areas of Cape Shoalwater on the northern shore of Willapa Bay. The shoreline has moved about 11,700 feet northward since 1887 and erosion

1/ Pacific County Regional Planning Commission, Pacific County Reconnaissance Element, June 1970.

2/ M. G. Poole and Associates, Land Use - Wahkiakum County, undated.

3/ Seattle District, U.S. Army Corps of Engineers, Public Information Bulletin, January 1972.

will continue if uncontrolled. The bank line has been eroding at a long-time average (84 years) of about 139 feet per year, but this erosion has accelerated in recent years. The problem is caused by a complex combination of natural forces. The main body of water in Willapa Bay lies to the south of the entrance. On ebb-tide flows, this vast body of water moves northward, then makes a sharp turn through 60-80 foot deep natural channel, adjacent to the Cape Shoalwater shoreline (the main channel for tidal exchange), the currents erode the outer edge of the channel, causing the channel to migrate northward, with resultant erosion of the uplands.

Erosion has destroyed public and private lands, including homes, businesses and recreational beaches. Erosion is now threatening about 765 acres of land with 29 homes as well as a section of State Highway 105. The highway is expected to be cut during winter storms within the next year or two. The highway provides the only direct link between the beaches and sport-fishing areas, including Westport, to the north and the principal cities of Raymond and South Bend at the head of the estuary to the east. Cost of relocating this highway is estimated at \$550,000. The highway embankment is the last natural barrier between the bay and cranberry bogs to the north of the erosion area. When the highway embankment is breached, by erosion, the southern part of the cranberry bogs will be exposed to salt water flooding during high tides when accompanied by strong southwest winds.

The erosion and the debris from the eroded area which is piled up against the bankline by waves limit access to the beach for recreational purposes and create a potential hazard to visitors. Some of the finest recreational beaches in the state lie to the north and south of the eroding beach, with clam digging a major recreational pursuit. While razor clams are abundant to the immediate north and to the south, they are nonexistent at Cape Shoalwater because of erosion. Building and construction have virtually ceased, as it is difficult to obtain improvement loans in the Cape Shoalwater area from federal, state, and local agencies or private lending institutions.

The Pacific County Reconnaissance Element has found that "the other erosion hazard is the sand movement above the high water mark. American beach grass, brush and trees form an adequate protective cover over much of the area subject to sand movement. In some areas with cover below the critical level sand movement constitutes a problem, especially where the cover is disturbed for housing development or is destroyed by over-use."

Tidelands

The destruction of tidelands and marshlands by filling and diking can have a profound impact on the physical and ecological aspect of an estuary. It is estimated that 6,300 acres of Willapa Bay marshlands and tidelands have been reclaimed for agriculture; another 300 acres

have been reclaimed for industry and highway purposes.

"Landfill projects are particularly destructive because they almost invariably destroy near-shore, shallow, highly productive areas. These margins are important grounds for the young of estuarine and estuarine-dependent organisms, nutrient regeneration, and production of organic matter.

For example, the destruction of the complex plant communities that occupy the marsh and intertidal areas eliminates a food source for many species of fish and wildlife. Once filled, these areas no longer provide ecological conditions for continued survival of numerous larval and immature forms of aquatic organisms important to the overall productivity of an estuarine area. The tidelands would no longer provide feeding and resting areas for shore birds and waterfowl.

Areas reclaimed, diked, or cut off from tidal circulation, reduce plant productivity and the flow of nutrients throughout the water depth. The location of the saline-fresh water boundary could be altered. Filling of tidelands and blocking of natural channels can modify current patterns and velocities resulting in erosion in one area or shoaling in another. Such changes can upset the delicate balance of an ecosystem and profoundly influence the abundance of fish and wildlife species in an area just as effectively as direct destruction of the species." ¹/

Land drainage

"The problem of excess water is the dominant problem of many of the agricultural soils in the area. Drainage ditches, tile lines, land smoothing, sod waterways and other drainage practices have been installed to improve drainage conditions on many farms. Some of these drainage systems have failed for the lack of maintenance or other reasons and need to be reconstructed. Other lands without drainage systems need to have drainage practices installed to permit more effective use of the land. Water tolerant vegetation such as reed canary grass has been one of the most serious obstacles to the maintenance of open ditches. Chemical methods of controlling water tolerant and aquatic vegetation without harming fishlife are not currently available." ²/

1/ United States Department of the Interior, Fish and Wildlife of Willapa Bay, Washington, 1970.

2/ Grays Harbor Soil and Water Conservation District, Resource Conservation Program, 1965.

Flood plains

The inclusion of Grays Harbor, Pacific and Wahkiakum Counties on the list of disaster areas by the Small Business Administration recently, and the newspaper reports of road and other damages to property, indicates that flooding is a common problem in the project area.

The following quote from a U.S. Army Corps of Engineers brochure, "Floods in Aberdeen, Hoquiam, and Cosmopolis, Washington", dated January 1971 expressed the problem and needs very well:

"To begin a realistic program of flood damage reduction, Aberdeen-Hoquiam-Cosmopolis must know the elevations that future floods can be expected to reach and areas which may be flooded. These data are available.

With the exception of the December 1933 flood, past floods have not caused extensive damage in the tri-cities area because of the limited development in the flood plain. As time passes, however, and residential and industrial development increases, there will be greater demand for building sites. Unless properly regulated, some of these sites could be on land vulnerable to serious flood damage. A further danger is that new developments in the flood plain, if unregulated, could be so constructed as to restrict the flow of water and thus increase flood heights. Flood data and reasonable regulations can be used to guide and control developments in flood hazard areas and to prevent an increase in flood damage. Such controls have been adopted by scores of cities and have become accepted as a practical approach to safe development and to prevention of flood disasters."

Small Multi-purpose Watershed Project (PL-566)

Since 1954, when the Watershed Protection and Flood Prevention Act (Public Law 566) was enacted, many rural and urban communities have shown that they can halt unchecked soil erosion and excessive water runoff on rural land, stop destructive floods, improve drainage conditions on land in agricultural production, provide for more efficient irrigation, supply water for growing municipal needs, attract new industries, enhance fish and wildlife resources, and provide developments for recreation.

Small watershed projects have come to mean protecting, managing, improving, and developing the water and related land resources of a watershed up to 250,000 acres in size through a project-type undertaking.

A project is planned and carried out jointly by local, State, and Federal agencies with the full understanding and support of a large majority of the landowners and citizens of the community.

It can include many purposes: flood prevention; agricultural water management; municipal and industrial water supply, both for present and future use; recreation and fish and wildlife development.

It is based on (1) local initiative and responsibility, (2) Federal technical, cost-sharing, and credit assistance, and (3) State review and approval of local proposals and opportunity for State financial and other assistance.

It is a combination of soil and water conservation measures on farm and ranch land, other rural land, and public land (land treatment) and structural measures (dams, levees, channels).

It bridges the resource-development gap between the soil and water conservation work of individual landowners and large Federal and State public works projects for water resource development in major river valleys.

Streambanks and riverbanks

There is a serious loss of soil and property by erosion of river and streambanks in the project area.

The direct result of streambank erosion is the silting of spawning grounds, the filling of navigation channels, and the shoaling of other harbor areas, and deposits on oyster beds.

Sediment yield

According to the Columbia-North Pacific Comprehensive Framework Study data the project area is in a generalized sediment yield area of .1 to 12 acre feet per square mile per year (see Inches Mean Annual Runoff map page 26).

This means that every five to ten years one foot of soil is lost if we distribute the loss uniformly over the area. Erosion is actually concentrated in critical areas such as steep, logged-off land, logging roads, and streambanks.

Of the 3,079 square miles in the project area roughly 1,215 drains into Grays Harbor. Every five or ten years this is equivalent to 15 feet of sediment in Grays Harbor. Roughly 939 square miles drains into Willapa Bay. Every five or ten years this is equivalent to $7\frac{1}{2}$ feet of sediment in Willapa Bay.

Obviously, in actual practice all of the sediment does not remain in the estuary nor does it settle out uniformly. A portion of it enters the ocean.

Opportunities, needs, problems

The following list of suggestions and opinions were solicited from local people in the Coastal Crisis Workshop, January 8, 1971. These were selected from the summary of the land use sessions:

1. The multiple use concept was endorsed to insure balanced land use in shoreline areas.
2. More open space along the beach was considered desirable and should be acquired.

In addition to the opportunities, needs, and problems discussed above, local people serving on resource committees have identified the following:

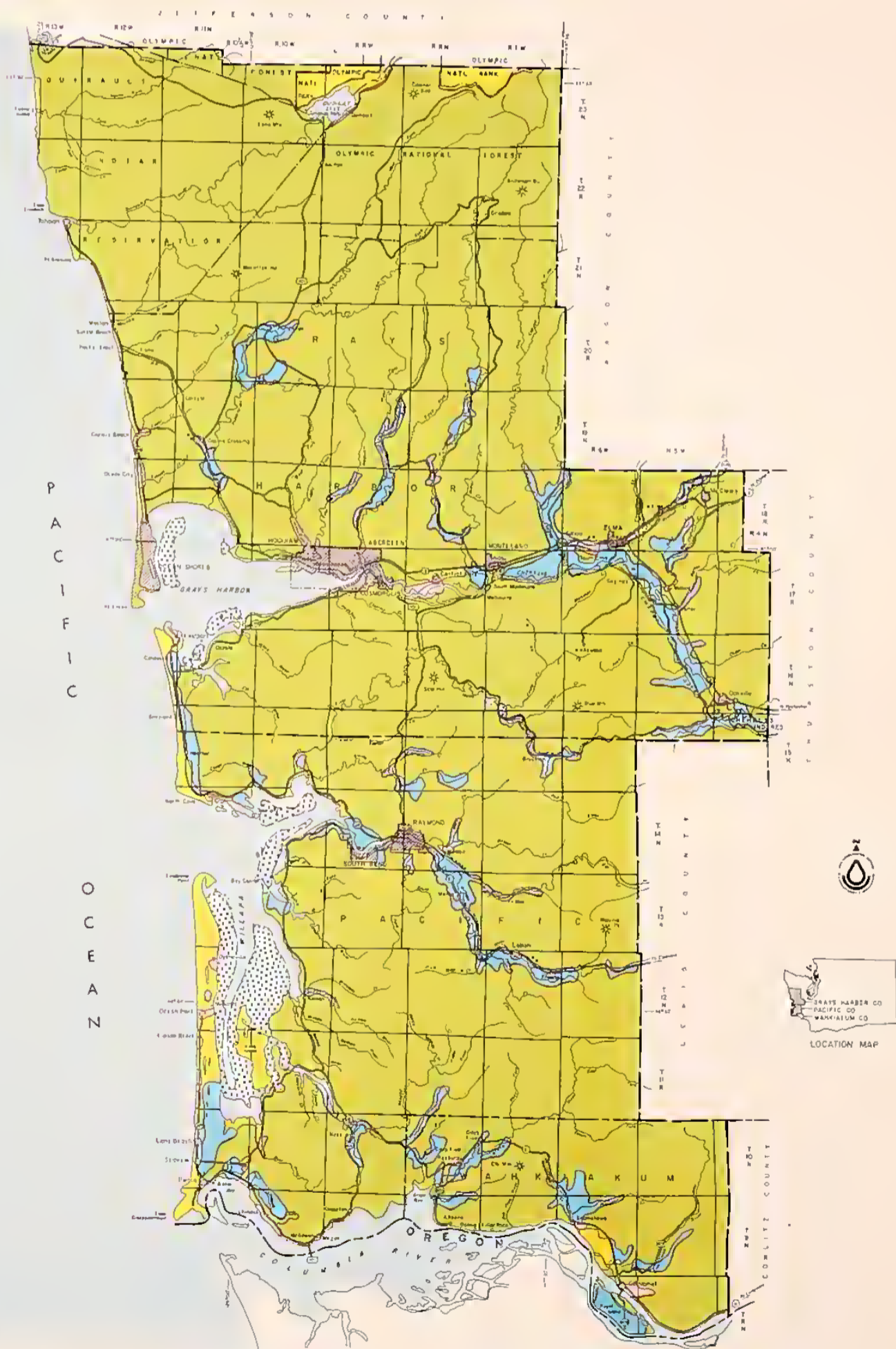
1. Promote land use planning and zoning and encourage coordination of planning and implementation between local governmental units of the project area.
2. Consider establishment of a strict commercial agriculture zone and a strict commercial forestry zone.
3. Encourage up-to-date soil surveys where needed, and development of interpretive data for use by all agencies interested in proper land use in the project area.
4. Bank areas should be rip-rapped where raw soil is eroding into streams.
5. Zoning of sewage and sanitary land fill areas.
6. Proper use of shorelines.
7. Maintaining open space on the beaches.
8. Need county-wide flood control zones and districts.
9. Provide information and other assistance to prevent loss of life and property by flood plain mapping, flood insurance, and flood control measures and other related projects.
10. Support the formation of county river basin flood and water control districts in the project area.
11. Develop flood control structures including dikes and tidegates to control heavy runoff and high tides. Keep existing dikes and tidegates in good repair.
12. Study entire watershed rather than parts of them.

Note: Most resources in the project area excluding the ocean are directly related to land or land use. Examine the various problems and measures elsewhere in this resource action program and note this inter-relationship.

LEGEND

- AGRICULTURE
- COMMERCIAL OR RESIDENTIAL
- RECREATION OR WILDLIFE
- WOODLAND
- OYSTER BEDS
- WATER

(Generalized from MIADS-360 existing Land-Use Maps
U. S. D. A. Soil Conservation Service)



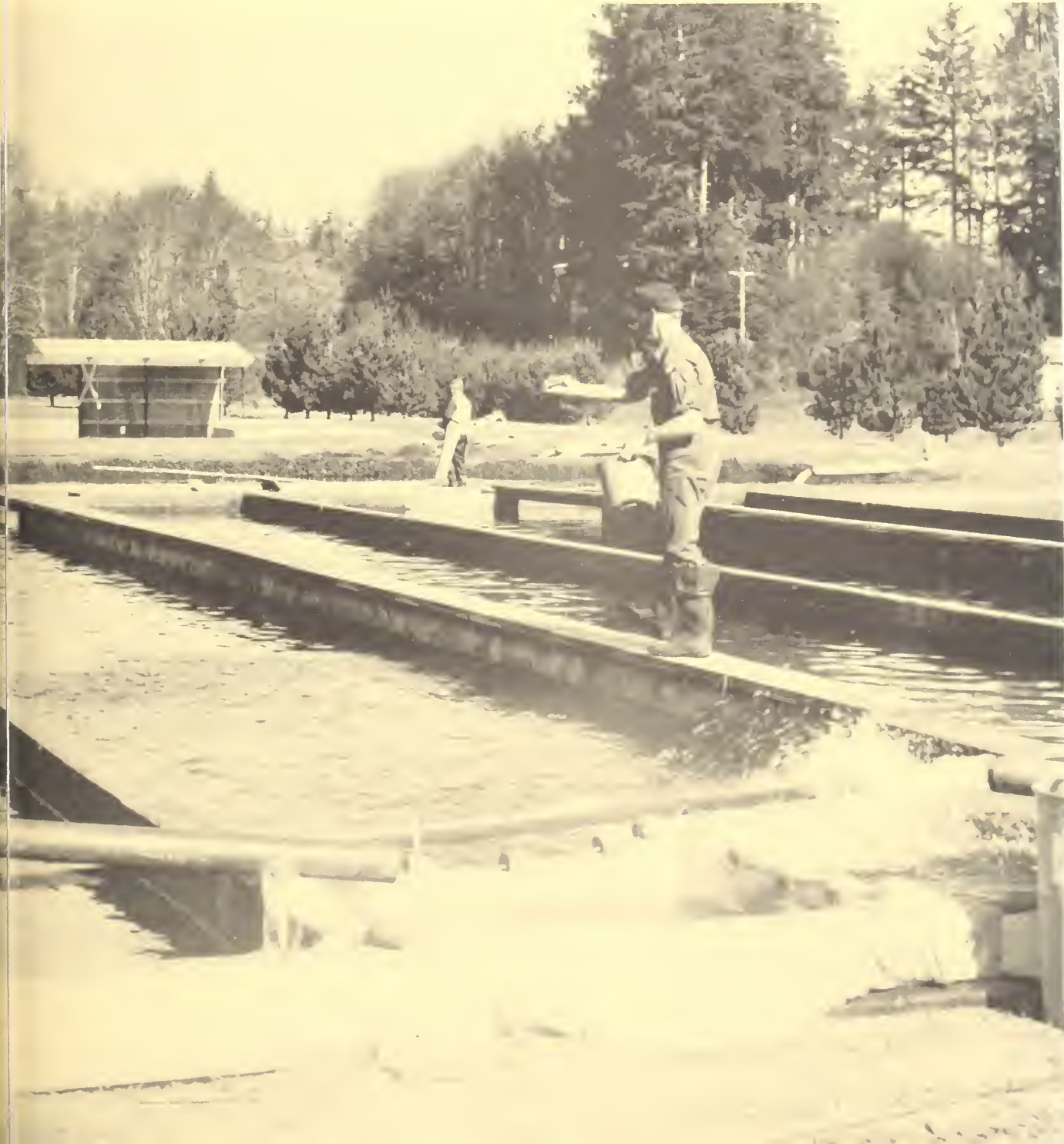
GENERALIZED LAND USE
COLUMBIA - PACIFIC
RESOURCE CONSERVATION & DEVELOPMENT PROJECT
GRAY'S HARBOR, PACIFIC AND WAHIAKUM COUNTIES, WASHINGTON
FEBRUARY 1972
SCALE 1:500,000



MARICULTURE

State Department of Fisheries' salmon hatchery at Nemah, Washington.

HEN DALE PHOTO



MARICULTURE CONTENTS

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MARICULTURE 1 /

Commercial fisheries within the project area in order of greatest value includes crab, salmon, and oysters. Other important resources are albacore, smelt, and razor clams. Table 25 shows production and value to commercial fishermen for the project area:

TABLE 25. PRODUCTION AND VALUE OF COMMERCIAL FISHING
FOR PROJECT AREA 1969 1 /

(pounds and value in thousands)

<u>District</u>	<u>Salmon</u>		<u>Crabs</u>		<u>Oysters</u>		<u>All Other</u>		<u>Total</u>
	<u>lbs.</u>	<u>val. 2/</u>	<u>lbs.</u>	<u>val. 2/</u>	<u>lbs.</u>	<u>val. 2/</u>	<u>lbs.</u>	<u>val. 2/</u>	
Grays Harbor	5,049	\$2,437	11,980	\$2,867	407	\$ 139	3,225	\$444	\$5,887
Willapa	773	298	4,341	1,004	3,101	1,097	143	13	2,412
Columbia River	2,319	888	1,706	410	--	--	2,529	390	1,688
Total	8,141	\$3,623	18,027	\$4,281	3,508	\$1,236	5,897	\$847	\$9,987

Salmon, steelhead, and searun cutthroat trout

The Grays Harbor district has the most important segment of the commercial fisheries industry of the project area producing about 60 percent of the total value for the entire southwest coastal area.

This harbor, smaller than Willapa, but with a larger river (Chehalis) flowing into it has a much better harbor entrance with a protected bar crossing. It has a large commercial fishing fleet and a large sport charter boat fleet. The latter is centered at Westport near the harbor entrance. In 1969, sport salmon landings at Westport were 57.5 percent of the 467,700 fish landed in the project area.

The salmon resource supports local sport, commercial troll, and gillnet fisheries as well as contributing to ocean sport and commercial trawl fisheries. The Grays Harbor gillnet fleet has about 170 boats and the Willapa Bay gillnet fleet consists of 75 to 100 boats. The Grays Harbor sport boat fleet of about 500 is augmented by hundreds of trailered boats during the summer. In Willapa Bay there are about 25 sport boats, while in the Columbia River ports of Ilwaco and Chinook trailered sport

1 / from: Washington State Department of Fisheries, except where noted.

2 / Value to fishermen.

boats number up to 2,000 during the summer. They pursue fish in the lower Columbia River both inside the bar and outside. Most of the Westport sport fisheries occur in the ocean as far south as Willapa Bay.

The peak production occurred in the nineteen forties and fifties and dropped to a low in 1963. Production has been rising in recent years as hatchery production efficiency increased (see Table A-13, appendix). As dams and pollution continue to be major fisheries problems, the importance of coastal rivers becomes greater. Increased production of food fish in the streams of Willapa Bay should be encouraged.

Increased port facilities at Ilwaco may cause a shift of commercial fishing vessels to it as the troll salmon fleet expands along with the increase of salmon.

There has been a very small recreational salmon fishery located near Tokeland at the mouth of Willapa Bay during July and August of each year. Most of the recreational fishing effort is at the mouth of the Columbia River and centered in Ilwaco and Chinook. The highest catch per fisherman along the Washington coast occurs at the Columbia. This, with the expansion of the Port of Ilwaco, will certainly increase recreational fishing in that area.

Crabs

Grays Harbor has traditionally landed the largest annual poundage of Dungeness crabs for the project area with most of the ocean crabber fleet centered at Westport. Annual landings varied from a high of more than 9 million pounds in 1948 to 1.3 million pounds in both 1952 and 1953. Landings of from 4 to 6 million pounds occurred in recent years until 1969 when nearly 12 million pounds were landed in Grays Harbor. The value of that catch to the fishermen was about \$2,867,000 of the total commercial fisheries value of \$5,986,651 for 1969.

Immature Dungeness crab occur in both Grays Harbor and Willapa Bay suggesting that these bays are important nursery areas. Because Willapa has no industrial centers like Aberdeen and Hoquiam, its tidelands are the most important as fisheries nursery grounds.

Three widely separated years, 1948, 1956, and 1969 exceeded 4 million pounds in crabs landed in the Willapa Bay district. However, in 1970 the landings dropped to 2.5 million pounds and the 1971 production will be even lower (see Table A-13, appendix).

This fishery resource is extremely variable with fishermen moving into it during high production years and out of it during low production years. Willapa Bay is a tremendous nursery area for juvenile Dungeness crab. Therefore, degradation of water quality or reduction in the estuarial tidelands would have an adverse effect on this fishery.

The total landings for January 1970 were 1.1 million pounds of live crab, however, the February and March landings which are normally less than January were 4.2 and 4.7 million pounds. These were fourth and second highest monthly landings on record and would have been higher if market conditions had not been generally depressed, forcing processors to restrict landings. The April and May landings of 3.2 and 2.8 million pounds were the highest on record for these months.

A few boats continued fishing through September 15 when the season closed. Total catch was 17.7 million pounds, second only to the record season of 1969 when 18.4 million pounds were landed. The crab fleet was also the largest in recent years with 108 ocean boats, and 30 boats fishing inside the coastal bays, using an estimated 34,000 pots. Average price to the fishermen was 20¢ per pound, although it went as low as 16¢ in some areas.

The Washington coast produced more than 12 million pounds of crab during the recently completed 1971 season, according to Tollefson. This falls short of exceptional catches in 1969 and 1970, but is still the fourth largest coastal catch on record.

Oysters

Grays Harbor has slowly declined in Pacific oyster production from a peak of more than 1 million pounds per year in 1955-56 to little more than 400,000 pounds per year in 1969. This decline is generally attributed to heavy industrial pollution in Grays Harbor.

Willapa Bay produces 50 to 55 percent of the Pacific oysters (5 to 7 million pounds) processed in Washington state each year. In recent years annual production from the bay has varied from 3 to 4 million pounds, much lower than that of the period from 1937 to 1942 when production ranged from 5.8 to 10.7 million pounds per year. (see Table A-13, appendix)

Grays Harbor oyster production rose from a little more than 300,000 pounds per year in 1935 to one million pounds per year in 1955 and 1956 then gradually declined. By 1969 production was about 400,000 pounds per year and apparently stabilizing at this level which is less than 7 percent of the Pacific oysters produced in Washington.

The oyster market has not expanded with the population. Prices are at the same level as those of 15 years ago, although materials, oyster seed, and labor costs have risen. Labor costs have been offset partially by increased mechanization. However, this industry still requires a labor force of semi-skilled openers. Due to a low wage pattern and seasonal employment, young people are not entering this industry. A large part of the labor force is composed of retired and semi-retired men and women.

Pacific oysters do not propagate naturally in Grays Harbor in sufficient quantities to be of practical significance. The industry is small and its needs for seed oysters are filled by Japanese, Dabob Bay, Pendrell Sound or Willapa Bay supplies.

Since 1959, only the summer seasons of 1964, 1966, and 1967 produced commercial spatfalls in Willapa Bay. The summer of 1970 did not rise to its early promise.

This industry will retain its present level of production and value as long as the bay retains its unpolluted state. Production will increase only if product price increases under pressure of demand for oyster products.

Clams

Hardshell clams, including the native littlenecks, butter, gaper, cockle, and Manila clams are present in a porous mixture of sand, gravel and mud within the tidal zone of Willapa Bay and Grays Harbor.

The softshell clam occurs throughout the tidelands and is most frequently found in muddy or sandy mud bottoms in the upper tidal areas and in the brackish water areas of tributary streams. These clams are not taken commercially to any significant extent. However, this is the same species that supports an important and valuable commercial fishery along the New England seaboard.

In 1968 commercial razor clam digging was prohibited on Washington beaches except the detached Willapa Bay spits and the Indian reservation. Since production from the Willapa spits is sporadic and low, practically all clam production is from the Indian reservation beach.

Copalis Beach, Grays Harbor County, has the highest use by sport clam diggers of all Washington beaches. However, the trend is for increased sport digging on all three of the ocean beaches in the project area (see Table A-14, appendix).

Tourism, weather and the availability of razor clams greatly affects this fishery from year to year. The availability of larger clams (more than 3.5 inches in length) was improved by the beach closures. However, the increase in diggers during good digging periods offsets that increase. Reduced spawning and setting of razor clams during recent years has had an adverse effect upon the total clam population.

Shrimp

"Both burrowing and free-swimming varieties are found in the bays. The free-swimming varieties move into shallow waters and tideflats with the incoming tide and return to deeper channels at low tide. These detritus feeders are an important diet element to all fish large enough to eat them. These shrimp are not taken commercially in this area." ^{1/}

^{1/} Adapted from: United States Department of Interior, Fish and Wildlife of Willapa Bay, Washington, 1970.

Forage fishes 1/

This group includes anchovies, herring, and smelt which are extremely important forage for other fish.

Pacific herring use the bays as a spawning and nursery ground. The eggs are adhesive and can be found on rocks, piling, seaweed, and eelgrass during January and February, where they remain until hatching. Immature herring are found in the bay during the spring, summer and fall months.

Northern anchovies, although spawning in the ocean, are plentiful in the bay during the period June through September. This species, together with the Pacific herring, represent a latent resource that could support a significant fishery, particularly as bait for adjacent sport fishing areas.

Longfin and silver smelt occur in the area. In general, the longfin smelt are in the deeper water, while the silver smelt inhabit the plankton rich tidal flats. Longfin smelt spawn in the brackish and lower freshwater reaches of tributary streams, while the silver smelt spawns on coarse sandy beaches. The abundance of these species is unknown.

American shad adults migrate through Willapa Bay during the late spring and early summer on their way to upstream spawning areas. Willapa River is the main spawning stream, although the Palix, North, and Naselle Rivers are used. A minor sport fishery exists for this species.

Sturgeon

Green and white sturgeon are found in Grays Harbor and Willapa Bay. They also occur in the Columbia River.

According to the Washington State Department of Fisheries: The Grays Harbor catch of green sturgeon in 1970 (34,043 pounds) was about 6,000 pounds below the average since 1953. The white sturgeon catch of 35,188 was nearly 6,000 pounds above the average. The green sturgeon catch is nearly all taken by gillnet whereas the 4,849 pounds of white sturgeon was taken by set lines.

The Willapa Bay white sturgeon catch of 6,616 pounds was very good, exceeding the 1953-1969 average of 4,847 by 3 percent, but was down considerably from 1969. The green sturgeon catch of 130,491 pounds has exceeded any year of record.

1/ Adapted from: United States Department of Interior, Fish and Wildlife of Willapa Bay, Washington, 1970.

Other fishes 1/

Starry flounder; sand dab; several species of sole, sea and surf perches; rock and bottom fish; and related species utilize the bay as a nursery area. Starry flounder are abundant throughout the tideflat and shallow water areas, and although a fine food fish, are not taken in large numbers.

Young of the numerous species of rock and bottom fishes, sole, sea perches, etc., utilize the bay as a nursery area. As they mature, they migrate to the deep water areas and ocean front where they are taken in the various fisheries. Although no significant bay sport fishery for these fishes has developed, these species could support one.

Opportunities, needs, problems

Most of the streams in Pacific County need gravel cleaning to remove silt from salmon spawning grounds. The silt is from the erosion of stream-banks, logging roads, or from logging in and near the streams.

Gravel placement - would place gravel for spawning in streams lacking natural spawning areas. It would particularly be suitable for Coho.

"There is a real need for a center for oceanographic activity, on the coast for the coast, to consolidate and focus on the unique needs of the coastal area and near coastal environs." 2/

The following "Pacific County Marine Concerns" were adapted from a list compiled by Dr. Edward L. Senner, former County Extension Agent:

1. Concern that since 1962 cities' sewage lagoon outfalls have been going in the Willapa River and eventually into Willapa Bay.
2. Concern that since 1962 the effluent from a hydraulic log barker has continued to go into the Willapa River.
3. Concern that hydrologic studies in Willapa River and Willapa Bay have thus far been inadequate, and further that results from the present monitoring unit (Department of Ecology Station 243090) have not been made available for local public health units or for seafoods industry which could benefit from these reports.
4. Concern that there has been a lack of legislative support for continuous water monitoring of major estuaries and rivers (present DOE budget allows for 4 man years to monitor waters, 0.5 man years is required for each unit).

1/ Adapted from: United States Department of Interior, Fish and Wildlife of Willapa Bay, Washington, 1970.

2/ Cooperative Extension Service, Montesano, Washington.

5. Concern of those developing a zoning plan to insure land and water use restrictions which will preserve the high quality of this estuary. Without specific knowledge of how present practices are reflected in character of the bay, it is difficult to suggest reasonable restrictions on land use in the drainage basin and along the shores of Willapa Bay. There is concern for tideland zoning for agriculture and zoning for dredge spoil disposal sites.
6. Because of the tenuous balance in water resources with competing industries of forestry (wood products), seafoods industry and agriculture, there is concern regarding the politics of "trade-offs". The lesser industries are concerned about the power of the larger industries. Concern that a public education program be initiated to inform the local public regarding the needs of each supporting industry, and the limiting factors of pollution and factors of limited resources as they influence the future of these basic industries.
7. Concern for manpower training programs, such as Sea Resources, Inc., as they seek to develop skills for youth in the commercial and tourist fishing industry. Finances and other resources are needed for continuity of this vocational training program.
8. There is a need to identify key spawning streams and beds and critical areas on rivers to assist in providing a TOTAL stream conservation program to protect our commercial and recreational fisheries. There is a concern over agricultural pollution of streams.
9. Concern for financial support to private oyster hatcheries to promote an economical source of oyster seed and research of other mariculture feasibility.
10. Concern that present municipal and county solid waste sites are in close approximation to the bay allowing leachate and runoff to directly enter the bay's estuaries.

In addition to the opportunities, needs, and problems discussed above local people serving on resource committees have identified the following:

1. Support the proposed Corps of Engineers Hydraulic Model Study of Willapa Harbor.
2. Update and evaluate water quality and other research on the Willapa estuary for future planning.
3. Obtain a reliable 24 hour local taped marine weather broadcast facility for the project area from the Columbia River to Grays Harbor.



LEGEND

- Chinaak Salmon
- Caha (Silver) Salmon
- Chum Salmon
- Sockeye Salmon (only in Quinault area)

NOTE: Many small to medium size streams not shown contain salmon runs.

SPORT FISHING AREAS: Lower portions of larger rivers. Check Washington State Fisheries Department Publication: "Sport Fishing Regulations for Food Fish".

COMMERCIAL FISHING: Check with Washington State Fisheries for regulations.

Salmon Spawning Information Compiled By:
Washington State Fisheries Department Coastal Lab
401 W. Wishkah, Aberdeen, Washington (Gene Deschamps)
Vancouver, Washington (Clint Stockley)



MAJOR SALMON SPAWNING AREAS
COLUMBIA - PACIFIC
RESOURCE CONSERVATION & DEVELOPMENT PROJECT
GRAYS HARBOR, PACIFIC AND WAHIAKUM COUNTIES, WASHINGTON

JANUARY 1972
SCALE 1:500,000



RECREATION AND TOURISM

Three big ones that did not get away! STATE DEPT. OF COMMERCE & ECONOMIC DEVELOPMENT PHOTO



RECREATION AND TOURISM CONTENTS

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RECREATION AND TOURISM

Recreation has become an important industry in this three-county area. The most important factor contributing to the recreation industry is the Pacific Ocean and its beaches. The ocean has a certain mystique, and people come to gaze at it, and fish its waters. Other people come to collect driftwood, camp, dig for clams, or wade in the surf. Other factors such as mild climate and scenic inland areas also contribute to the growth of recreation.

"This area is especially important for visitors residing in the major metropolitan areas of Puget Sound and Portland-Vancouver. The ease of access from these metropolitan areas coupled with the attractiveness of the ocean beaches indicate that the recreation and tourist industry is likely to become the most important economic activity in the project area. Therefore, it is extremely important to plan acquisitions and development of recreation facilities that will provide protection for existing resources and satisfy present and future recreation demands of people from within as well as from without the region" 1/

Recreation resources 1/

The area has resources capable of providing a wide variety of year-around recreational opportunities for residents and out-of-state visitors. These recreation resources can be divided into two major types: ocean shorelines and forested uplands. The ocean shorelines and sandy beaches attract the greatest number of people to this region. A large number of people, however, prefer the cool pleasant picnic areas, campsites, hiking trails of the forested uplands.

Visitor counts 1/

This area's popularity with recreationists is exemplified by visitor counts at existing parks in the area. The Washington State Parks and Recreation Commission reported an overall attendance of 1,934,967 visitors at the parks it operates within the project area. Concurrently, the Washington State Department of Fisheries reports a sport salmon catch in 1970 of 572,604 fish which represented a substantial increase over the previous years. The State Parks and Recreation Commission also reported an attendance of over 2.5 million visitors on the ocean beaches of the tri-county RC&D project area.

1/ Interagency Committee for Outdoor Recreation, Olympia, Washington.

TABLE 26. OVERNITE USE OF STATE PARKS BY OUT-OF-STATE AND IN-STATE VISITORS

Park	Out of State Use <u>1/</u>	Out of RC&D Area Within Washington <u>1/</u>	Inside RC&D Area <u>1/</u>	Total Use <u>2/</u>	Value <u>3/</u>
Twin Harbors	24,307	84,140	1,540	109,987	\$164,980
Lake Sylvia	6,276	7,462	723	14,461	21,690
Ocean City	9,155	56,189	995	66,339	99,510
Fort Canby	17,645	37,165	330	55,140	82,710
Bush Pacific	4,521	2,059	20	6,600	9,900
Total	61,904	187,015	3,608	252,527	\$378,790

The value of the recreation industry as stated is probably very low as no secondary effects have been figured into the above figures.

Visitor impact

In a study currently being conducted by the Interagency Committee for Outdoor Recreation, a measure of the impact of the visitors to the RC&D area was obtained through an analysis of overnight campers in an Origin-Destination Study. This study found that 98.6 percent of the overnight campers in the RC&D area are from outside the area.

The parks located on the ocean beaches (Fort Canby, Ocean City, and Twin Harbors) account for over 15 percent of the total overnight attendance in Washington's State parks. In contrast, these ocean beach parks equal only about 4.5 percent of the total number of overnight camping parks in the system giving an indication of the popularity of the ocean beaches.

It would normally be expected that the larger and most popular parks would be the most attractive to out-of-state visitors. In terms of absolute numbers this is true but in terms of relative proportions, the small parks (Bush Pacific and Lake Sylvia) receive an unusually high number of out-of-state visitors.

The ocean beach parks appear to be relatively more attractive to Washingtonians living outside the RC&D area than to out-of-state visitors. A considerably higher relative percentage of out-of-state people visited Lake Sylvia and Bush Pacific - parks that are not ocean beach related. These parks are not destinations but merely stops along the way to more attractive and better known places. The distribution of out-of-state attendance in all overnight parks would give a better indication of the relative popularity of the various places in Washington and will be prepared for study in the future.

1/ Figures based on Origin-Destination Study by Interagency Committee for Outdoor Recreation

2/ As reported by the Washington State Parks Commission

3/ Value based on \$1.50 per visitor day

The impact of visitors migrating into the tri-county RC&D area is extremely important to the area's economy and an important consideration in planning new parks. When just Washington visitors alone are considered, approximately 1.92 percent of the state park camping is by locals. In analysis this figure becomes significant. Since approximately 2.3 percent of the state's population resides in the tri-county area, it appears that the camping participation by local people is less than what one would expect disregarding distance and only correlating participation to population. This means that either camping participation by RC&D residents is unusually low or that they travel outside the area to camp.

Origin-Destination Study ^{1/}

That they go outside the area to camp appears to be supported by the origin-destination study data. The camping participation at Lake Sylvia is relatively high for local residents, and the participation on the ocean beaches is quite low. They appear to express no desire to camp on the beaches. Quite likely local residents can fulfill their desire to visit the beach on day trips. When they do go overnight, it is most likely inland, in the direction of the mountains, which could explain in part the unusually high local residents camping participation at Lake Sylvia.

Economic impact

The economic impact of overnight campers in the RC&D area has not been established. A study by the Oregon State Parks Department conducted in 1969 found that the overnight campers spend an average of \$7.10 per person per day while camped in State Parks in Oregon. It was also found in the same study that day visitors expend an average of \$4.79 per day. These figures are from a neighboring state and may not be a reliable indicator of the economic impact of visitors to the RC&D area.

In 1969 a study completed by Battelle-Northwest, the recreation activities were surveyed for residents as well as visitors. The following information relates specifically to the beach areas: It was found that 68 percent of the visitors were adults, 13 percent teenagers and 19 percent were 12 years of age or younger. It was noted that 35 percent of the motel visitors came from a distance greater than 150 miles, while only 29 percent of the parties registered at trailer courts came from this distance.

Motel and trailer court registrations indicated that the motel visitors stayed on an average of 1.8 nights per visit and the average trailer court visitor stayed 3.5 nights.

^{1/} Interagency Committee for Outdoor Recreation.

Total recreation demand

The foregoing figures have been obtained from records of actual visitations at selected parks and facilities in the RC&D project area, but what of total recreation demand and the demand for new and expanded recreation facilities in the future? Estimates of this demand are found in the Washington Statewide Comprehensive Outdoor Recreation and Open Space Plan, First Official Revision, July 1969. The data in this Plan is presented by official state planning region. Therefore figures referring to this plan will apply to Region 2 even though part of the RC&D area lies outside this area. Driving for pleasure and visiting the beach rated as the top outdoor recreational activities in this region, showing that residents of the area visit the beach on an average of over 17 times per person per year. Local residents also participated in driving for pleasure an average of over 18 times per person per year. Other activities that were found to be very popular were outdoor swimming, walking for pleasure and bicycling. The foregoing figures are for demand by residents only. However, we have learned that the majority of recreation visits in this area are by non-resident visitors.

Future needs

The needs of these non-resident visitors become extremely important in providing facilities and developments in the project area. The State Comprehensive Plan found a need to acquire 700 acres of saltwater beach lands to meet the needs of recreation visitors in this area. Also of importance to the RC&D area is a need to acquire over 2,000 acres of freshwater shorelands, over 8,000 acres of wet lands. In addition the Statewide Plan indicates that over a million dollars should be spent on development of regional type parks in the area. These are the types of parks normally provided by county and state agencies. In addition the Plan shows a significant need for boating facility development.

Needs of this magnitude serve to point out the importance of recreation as an economic and social activity in the Columbia-Pacific Study Area. Future courses of action must be carefully charted. To the present date, there are approximately 72,000 acres of public recreation facilities in the tri-county area which are rapidly becoming inadequate as recreation participation increases at a rate even faster than straight population growth. This is due to a number of factors, namely the increased affluence of Seattle and Portland metropolitan families, number of available vacation days, improved and more rapid access to the area, and a growth in the local population. The inadequacy of this existing supply of developed lands can be attributed directly to the inability of public and private sectors to finance needed acquisition and developments. This is particularly true along the ocean beaches which are an extremely limited resource and where land acquisition cost has sky-rocketed over the last few years. The present state of the economy and related factors have leveled off some of these accelerating factors in the last one or two years. However, over the long run, with the economy returning to a more prosperous condition, recreation and population growth should continue to expand markedly.

The combination of population growth, recreation activity growth and competition for land use along coastal water has made public acquisition of saltwater frontage of critical concern. In addition these factors have made the acquisition nearly financially prohibitive.

As one of the outstanding resources in the state, the ocean beaches are of primary importance and of high priority for acquisition and development of recreation facilities. An increased effort by local units of government is necessary to insure that future beach users will have adequate access and adequate health and safety facilities to satisfy needs and demands of residents and visitors.

In addition, the local private sector should be encouraged and assisted with the development of recreation facilities for public use. Promotional programs are being implemented locally to attract tourists and recreationists on a year around basis.

Because driving for pleasure was indicated as such a popular activity for recreationists in the RC&D area, there is a need to designate a system of scenic roads traversing the tri-county area to enhance pleasure driving, sight-seeing and bicycling opportunities. Rest areas and view points should be provided, especially along areas of scenic interest.

The completion of the Wynoochee Dam in Grays Harbor County with its 4½ mile long reservoir, and three large future recreation areas will add a multi-million dollar recreation potential.

Hunting

Deer, elk, forest grouse, and waterfowl comprise the majority of wildlife species which are hunted in the Columbia-Pacific RC&D area. Other species such as band-tailed pigeon, California quail, bear, and rabbit are also hunted but on a greatly reduced scale. Stocking of ring-necked pheasant by the Washington Department of Game provides limited hunting for this bird. (see map page 126)

It was estimated by the Game Department that the following game harvest was achieved:

TABLE 27. GAME HARVEST (COLUMBIA-PACIFIC RC&D)

Harvest	Grays Harbor	Pacific	Wahkiakum	Total
1972 Big Game:				
Deer	2,750	1,660	460	4,870
Elk	510	500	480	1,490
Bear	560	300	90	950
1971 Upland Game:				
Pheasants	4,090	650	940	5,680
Grouse	18,010	9,700	2,270	29,980
Rabbits	620	1,540	230	2,390
1971 Waterfowl:				
Ducks	31,400	23,840	2,950	58,190
Geese	440	1,710	230	2,380
Pigeon	11,630	6,790	780	19,200
Snipe	1,260	3,690	30	4,980

It is expected that this rate of harvest will continue in the future with a possible decline of elk and deer should logging operations continue as presently anticipated. Vast areas of solid stand timber will result in lower game populations and lower game harvest.

Fishing

Coastal waters, plus rivers and streams in the area, provide some of the best fishing in the United States. This is particularly true of salmon fishing. The impact of anglers has created an entire industry based upon salmon fishing-the charter boat business. (see map following page 113)

A calculated total of 444,750 anglers took an estimated 876,648 salmon in Washington State waters in 1969. The Westport-Ocean Shores area represented nearly 34 percent of the saltwater catch with 270,777 fish, followed by Ilwaco with 25 percent or 200,379 fish. The catch of salmon in the fresh waters of the area amounted to less than 10 percent of the total catch.

Continued emphasis on management of salmon by the Department of Fisheries and trout by the Department of Game assures this resource to continue and possibly increase in the future.

Olympic National Forest ^{1/}

The dominant recreation uses on the Quinault District are camping, picnicking, water sports, hiking, fishing, hunting, berry picking and pleasure driving. Most of the developed recreation facilities are located in the vicinity of Quinault Lake. Other than recreation at developed facilities, the heaviest use occurs during the hunting season. Most of the hunters operate from undeveloped sites along the roads rather than from campgrounds.

Along the south shore of Lake Quinault, the District has three campgrounds with a total of 58 camping sites. This past summer, there was an average daily use of 67 percent on two of the three campgrounds. This amounted to 31.3 thousand visitor days. There are six campground facilities on the two Ranger Districts in the RC&D project area. The District also has a self-guiding nature trail: Last summer 28,000 visited the Big Tree Grove Trail.

Recreational use of other areas on the District is increasing rapidly as the road system is developed. Last year there was an estimated 72.2 thousand visitor days of recreational auto touring in the Quinault District in Grays Harbor County. Its popularity is greatest on existing loop roads and can be expected to extend to other loops as they develop. As more roads are built, more rivers are opened to the fishermen and more areas are available to the hunters. Hiking is presently limited to 26 miles of trails which offer only a limited amount of recreational

^{1/} Quinault Ranger District, United States Forest Service, Olympic National Forest.

opportunities. There is a fourth campground in Grays Harbor County. It is approximately 20 miles off Highway 101 and receives only light use. This campground has 20 camping sites and 6 picnic sites.

The Quinault Natural Area has been set aside to preserve an area of timber in its natural state for future generations.

There are 74 special use residences on Lake Quinault. Thirty have year long permits and the rest are for summer recreation use only.

Recreation trends

Several factors cause recreation trends to vary appreciably. The most significant factors are (1) population - market area, (2) income, (3) mobility, and (4) education. These have been shown to be very significant. However, recent trends and changes in general population attitudes coupled with the above factors have added to the complexity of determining demands for various recreation opportunities. Recent trends starting with the passage of the Land and Water Conservation Fund Act provided the necessary impetus to all levels of government to move forward with massive efforts to acquire and develop public recreation opportunities. The manufacturers of recreation equipment realized the importance of these factors as they became important to more and more people. Disposable income is increasing, four-day weeks are being implemented, new equipment is reducing the users dependency on highly developed areas, and the public attitude is rapidly changing from a Puritan "must work" philosophy to a leisure time society.

Trends by activity

Sight-seeing - The activity of sight-seeing encompasses such items as driving for pleasure, motorbike riding on roadways, bicycling on roadways, and visiting historical areas. With the designation of a system of Washington State Scenic and Recreational Highways through the area, the demand for sight-seeing increases quite measurably. The initial designation has been made on State Route 109 from its northern intersection with U.S. 101, south, to just west of Hoquiam, and State Route 105 from just south of Aberdeen to Raymond.

Picnicking and camping - Trends indicate a need to expand the capacity of camping and picnicking areas and facilities to meet the mushrooming demands caused by the normal growth rates of in-migration of new residents into the market area. The sale of new recreation equipment continues to accelerate faster than new areas can be acquired and developed by all levels of government and the private sector. The demand for these activities will almost double in the next decade.

Swimming (non-pool) - The demand for non-pool swimming facilities will increase by about 35 percent during the next 10 years. This indicates that the swimming demand will rise faster than the population growth. This condition is brought about by increased mobility, out-of-region demand and more leisure time.

Boating (trailerred, car-top, moored, and stored) - The boating activities indicate a continuing surge of boating demands in the area especially associated with the outstanding sport fishing opportunity for salmon.

Beach activities - By the year 1980 it is anticipated that average peak days demand at the beach will double if proper development of facilities and access is provided. A marked increase of retirement and recreational homesites will be developed all along the coastal waters. This action will reduce the availability of salt water beaches for an increasing general public demand.

The RC&D counties have within their control a combination of resources and features that collectively makes the area of statewide significance. Local entities would be well advised to capitalize on the influx of non-resident visitors rather than regarding these visitors as trespassers on their own private domain.

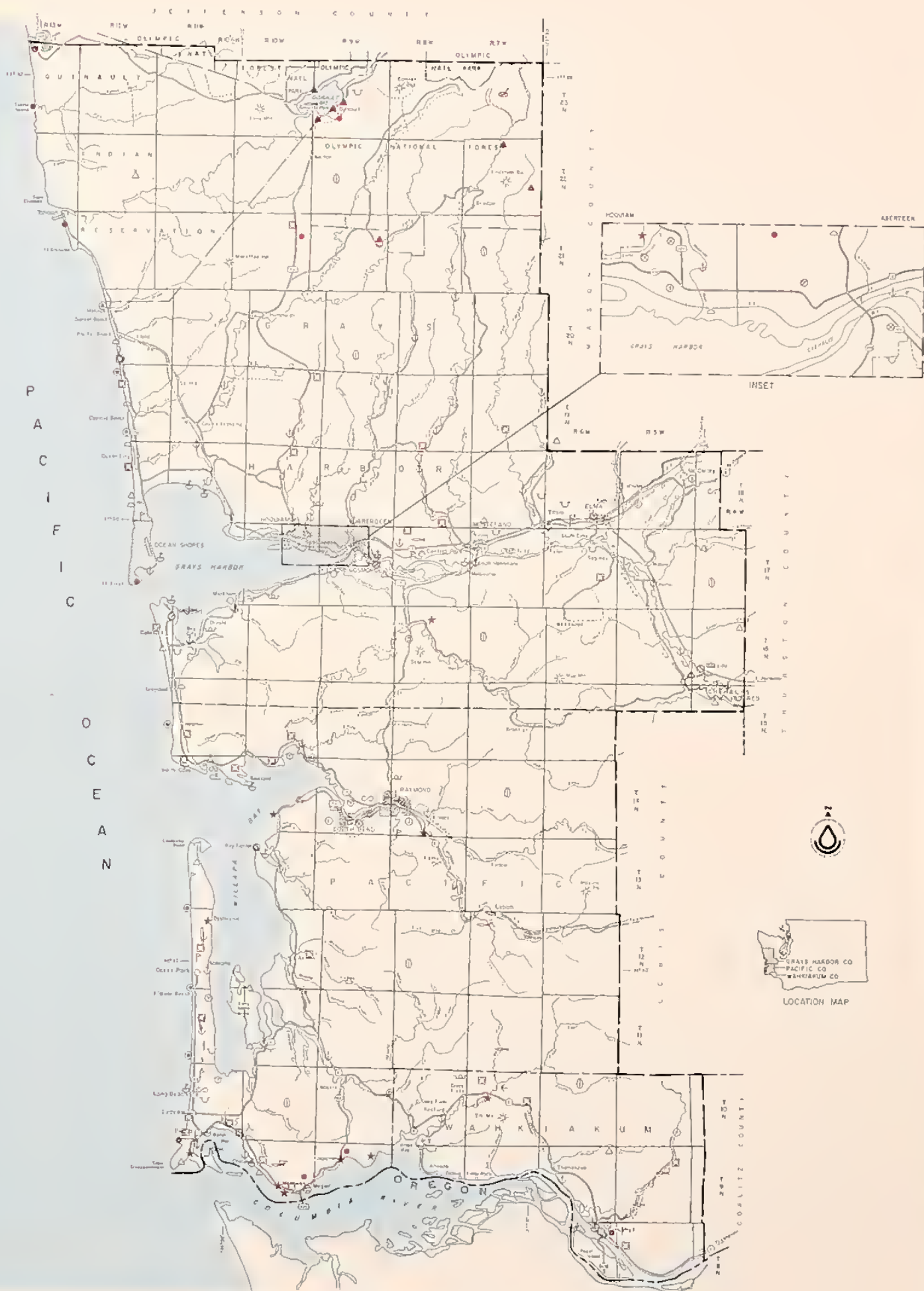
Opportunities, needs, problems

In addition to the opportunities, needs, and problems discussed above, local people serving on resource committees have identified the following:

1. To improve and/or develop more facilities for the leisure time and recreation of residents and tourists, such as overnight camping and boat moorage and launching.
2. Protect the recreation resources of the project area from exploitation by selfish public or private interests. Inventory these resources and carefully plan for their best use.
3. Support the establishment of youth camps and/or youth centers.
4. Form a legislative sub-committee to promote and support legislation that will enhance public and private recreation development.
5. Preserve certain areas of the project in their pristine state for enjoyment and study.

RECREATION MAP LEGEND

- | | |
|------------------------|--|
| Private Campgrounds | Fairgrounds |
| County Campgrounds | Swimming Pool |
| State Campgrounds | Juvenile Pond |
| Federal Campgrounds | Historical Sites |
| Boat Ramp | City Park |
| Fishing Access (river) | Rest Area |
| Gun Range | Natural Areas, Scenic, Point of Interest |
| Fish Hatchery (trout) | Bow Hunting |
| Fish Hatchery (salmon) | Big Game Hunting |
| Rock Hound Area | Bird Hunting |
| Bird Refuge | Reservations |
| Morino | Youth Comps |
| Stables | Trails |
| Golf Course | Motor Bike Track; Go-Kart |
| Picnicking | Canoe Trails and/or Roces |
| Chorter Fishing | Deer Refuge |
| Museum | Ski Area |
| Beoches | |



GENERAL RECREATION LOCATION MAP
COLUMBIA-PACIFIC
RESOURCE CONSERVATION & DEVELOPMENT PROJECT
GRAYS HARBOR, PACIFIC AND WAHIAKUM COUNTIES, WASHINGTON

MAY 1972
SCALE 1:50,000



WILDLIFE AND BEAUTIFICATION

Large numbers of elk and deer find adequate habitat in the Project Area.

DEPT. OF GAME PHOTO



WILDLIFE AND BEAUTIFICATION CONTENTS

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WILDLIFE RESOURCES

Willapa Bay is probably the least affected by man of all the major bays on the West Coast of the United States. This bay, with its many natural resources and pleasurable surroundings, is well known and enjoyed by thousands of people annually who want the opportunity to walk, to row a boat, to fish, to hunt, to picnic, to take pictures, or merely to observe the natural world of the bay.

Water-associated birds ¹/₁

Willapa Bay and the Columbia River estuary are essential resting places, feeding areas, and wintering grounds for important segments of the migratory bird population of the Pacific Flyway. About 210 species of birds are resident or regular visitors to the Willapa Estuary and adjacent uplands, and at least 66 of these have been recorded as nesting in the area.

Water-associated birds can be described in four groups. These include waterfowl - whistling swan, black brant, dusky Canada goose, American widgeon, mallard, pintail, green-winged teal, canvasback, greater scaup, bufflehead, white winged scoter, common scoter, and mergansers; shorebirds - western sandpiper, least sandpiper, sanderling, and black bellied plover; seabirds - gulls and terns; marshbirds - great blue heron and American bittern. Some birds are found solely in one habitat type; others depend upon a variety of types. Herons and bitterns, although common, cannot be considered abundant. Ducks, sandpipers, and sanderlings are present seasonally in tremendous numbers.

Marshlands, tideflats, and open water are the major habitats. Sand dunes, grassland, and forested uplands surround the bays. The major marsh areas are located along the rivers. These marshes are used for feeding, nesting and shelter by many species of birds.

Exposed mudflats and tidelands produce snails, worms and insects upon which shorebirds feed. In addition, tideflat and shoal areas provide an abundance of flora and invertebrate fauna which comprise the diet of many species of waterfowl.

The more open and deeper water is used by ducks, geese, cormorants, grebes, loons, gulls, and terns for feeding and resting purposes.

Willapa National Wildlife Refuge was established in 1937 to provide a protected wintering area for Pacific black brant. The extensive beds of eelgrass in Willapa Bay supply these birds with their preferred food, and protection afforded by the refuge allows them to utilize it unmolested. Black brant nest on the arctic tundra of Alaska and Canada, and

¹/₁ Adapted from: United States Department of Interior, Fish and Wildlife of Willapa Bay, Washington, 1970.

winter at the refuge from October through May.

The Willapa refuge is also an important wintering ground for the dusky race of the Canada goose. It also provided habitat for many other species of migratory and resident wildlife. It contributes to the local economy and the total national resource management program. It consists of 9,600 acres of federally owned land and water and about 10,000 acres of state tidelands and water.

Waterfowl use of Willapa National Wildlife Refuge varies between 3 and 4.3 million use-days annually. Peak use is about 55,000 birds. Total use of the bay approaches 6 to 9 million waterfowl use-days annually, with peak population of 100,000 birds. An estimated 25,000 hunter-days occurred for waterfowl in this area during 1965 with hunter expenditure values of \$162,500. Willapa Bay habitat provides seasonal requirements for waterfowl and other migratory birds of the Pacific Flyway; therefore, it contributes to the hunter days and other recreational use that occurs elsewhere in the Flyway.

Willapa Bay is an important migration and wintering area for black brant. Black brant are extremely selective of their living range. The broad tideflats and extensive eelgrass beds provide food, gravel, and loafing space vital to the survival of this species along the Washington coast.

Marine mammals 1/

Harbor seals are seen throughout the bay. Hauling grounds, areas where the young pups and adults can leave the water to rest, are needed. California and Stellar's sea lions and porpoises are often seen in the bay.

Fresh water mammals 1/

The mammals of economic importance inhabiting the bays and adjacent lands or tributary waters include beaver, muskrat, mink, otter, and racoon. While these animals are not dependent on an estuarine environment, the loss of irreplaceable riparian or marsh-type habitat adjacent to the estuary would greatly reduce the area available to these species.

Land animals

"Wildlife is an integral part of the ecology of the area. Lack of extensive areas of diversified habitat regulates populations to those species associated with coniferous forests.

Major species common in the area are elk, deer, blue and ruffed grouse, band-tailed pigeon and California quail. Lesser species are bear, cougar, coyote, racoon bobcat, rabbits and hare.

1/ Adapted from: United States Department of Interior, Fish and Wildlife of Willapa Bay, Washington, 1970.

Elk, deer, and forest grouse are found throughout the three counties with higher populations generally in Grays Harbor County. The Washington Department of Game estimates the population of deer at about 28,000, elk 12,000, and forest grouse 60,000 in the three counties.

Columbia white-tailed deer are found along the Columbia River between Cathlamet and Skamokawa in Wahkiakum County. These small deer have been placed on the endangered species list by the U.S. Fish and Wildlife Service. Little is known of these deer or their present populations. Establishment of the proposed Lower Columbia River National Wildlife Refuge should assure a stable or rising population of this endangered species. It will contribute to the local economy and have national and international significance.

Timber management, if continued at the present level, may well lead to lower populations of elk, deer and forest grouse. A vast portion of the project area will have been cut over within a few short years and re-established in trees. Faster growing trees and fertilization will shorten the period of browse growth which follows clear cut operations and reduce the length of time the areas are valuable to deer and elk. The quick establishment of large portions of the three county area to solid timber stands will lower big game and grouse populations at the time when increased demands are being put on the resource by sportsmen.

Inasmuch as most of the wildlife of the area are forest-oriented, the trend in total wildlife populations can be expected to decrease." 1/

"The two main big game species in the Olympic National Forest are Roosevelt elk and blacktailed deer. The populations and habitats of these browsing animals are directly related to the timber management program. Past timber harvesting at elevations below 1,500 feet has produced large areas of high quality habitat. As a result, large numbers of elk and deer find adequate year-round habitat at low elevations. As the young plantations grow and the crowns of the conifers close together, the low elevation areas will lose their ability to support browsing animals. Future populations of deer and elk will be directly dependent upon future timber management practices, particularly in the areas below 1,500 feet. The Ranger District has 40 wildlife transects in the winter range to get an approximation of the amount of wildlife use. They will be administered jointly by the Forest Service and the State Game Department from now on.

Black bear are generally abundant in the Quinault District. Bear are no longer classified as predators in Grays Harbor County. This former classification was the result of bear feeding on the inner bark of young conifers. Bear damage to conifers in the Quinault District is low.

Cougar are considered common to the Quinault District and find protection in the remote and rugged terrain. The cougar acts as a natural controller of quality of deer and elk populations, but is always in

1/ Soil Conservation Service, Spokane, Washington.

danger of serious depletion. Emphasis should be given towards encouraging sport hunting of cougar with eventual establishment of a season and bag limit by the Washington Game Department.

Upland game birds

Ring-necked pheasant populations are small and hunting is maintained only through stocking programs of the Washington Department of Game.

Upland game birds include both blue and ruffed grouse. Geese and ducks make their greatest use of the District's lakes and streams during the spring and fall migration. Both golden and bald eagles are frequently seen. If nests are located on the Quinault Ranger District they will be given full protection from all disturbances." ^{1/}

Sports fish - salt water and fresh water

Fish resources in both salt water and fresh water rivers and streams are one of the major attractions of the area.

Over 1,000 miles of trout streams exist within the project boundaries. These streams provide high quality habitat for spawning and growth of rainbow trout, steelhead, and searun cutthroat as well as various species of salmon such as Chinook coho, and chum.

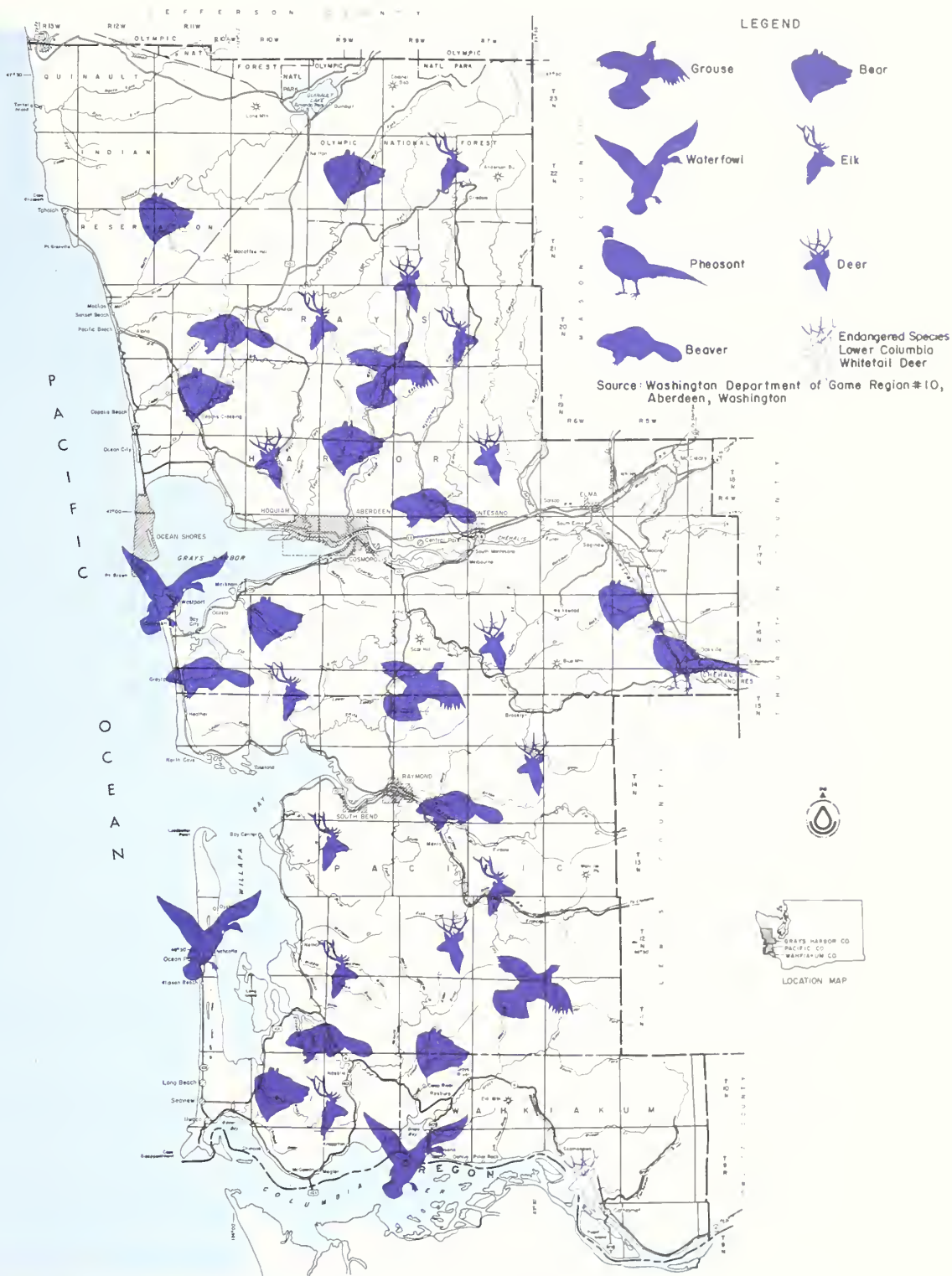
Grays Harbor and Willapa Bay are major factors in the production of salmon, steelhead, and cutthroat. They provide feeding and nursery areas as well as serve as migration routes to spawning areas in tributary streams.

Over 175 lakes and reservoirs exist in the project area. With the exception of Quinault Lake they are mostly small shallow lakes.

Land and water management within the project area must improve in the future to assure continued high populations of salmon, steelhead, cutthroat, and rainbow trout. Existing pollution which blocks the lower Chehalis system needs to be reduced to allow greater use of the river and its tributaries by spawning fish.

The Department of Fisheries operates five salmon hatcheries in the area and the Department of Game has two steelhead trout hatcheries. Continued research in the management of native, as well as hatchery released fish, should stabilize or raise the fisheries resources in the three counties.

^{1/} Adapted from: United States Forest Service, Quinault Ranger District, Olympic National Forest.



MAJOR WILDLIFE SPECIES
COLUMBIA - PACIFIC
RESOURCE CONSERVATION & DEVELOPMENT PROJECT
GRAY'S HARBOR, PACIFIC AND WAHIAKUM COUNTIES, WASHINGTON

MAY 1972
SCALE 1:750,000

"The rivers and streams of the Quinault Ranger District are spawning and rearing habitat for resident and anadromous fish. Fish produced in these waters provide world famous fishing both in the ocean and in the streams. Most spawning takes place during the fall and winter months, but anadromous fish can be found in the rivers at most times of the year." 1/

BEAUTIFICATION

Appearance of residential districts is likely to be somewhat shabby because local wood is often left to weather rather than being painted. The interior of many of these older homes is more modern and beautiful than one would expect from outer condition.

Many public buildings in the project area require rehabilitation. A research program is needed to survey renovation and repair needs in each town.

Rundown and vacant buildings are in various stages of deterioration, with old discarded cars evident throughout the area.

Littering is a continuing problem throughout the project area: the cities, the rural areas, the beaches, and the forests have become "solid waste" disposal sites for the inconsiderate, illiterate, or sick members of our society.

The use of auto bodies for streambank erosion control is not effective, and destroys the natural beauty of an area. Stockpiling of car bodies adjacent to streams for future bank protection creates eyesores in our natural environment. Cars used in this way also create a pollution problem.

A coordinated area-wide beautification program could result in a clean-up campaign which would do away with the ugliness in our surroundings.

Many more tree and shrub plantings are needed to beautify the city streets and parks.

Federal, state and county highway departments should be encouraged to include beautification as part of highway improvement and maintenance programs.

An information and education program can be initiated to improve the general attitudes and civic pride of the residents.

Professional landscaping should be a part of all park and recreation area plans.

Many buildings should be razed; others can be restored.

1/ Adapted from: United States Forest Service, Quinault Ranger District, Olympic National Forest.

Some may have historical significance warranting restoration and preservation.

An "Area Beautification Contest" similar to that of the Upper Willamette RC&D Project could encourage communities to work together on beautification programs by competing with one another for an annual award and recognition.

Suggested "Area Beautification Contest" projects:

1. Mowing margins of all streets particularly town entrance roads.
2. Grooming of individual homes, business property and public buildings and grounds.
3. Painting of homes, business and public buildings.
4. Clearing brush, weeds and junk (including abandoned cars) from vacant and occupied property.
5. Removing old and useless buildings.
6. A well designed sign at entrance to town.
7. Street signing.
8. Street tree planning and planting
9. Street improvements, grading, surfacing, sidewalks.
10. Sanitation - storm and sanitary sewers, garbage removal.
11. Sign board control.
12. Park development - roads, trails, shelters, picnic facilities, sanitation, planting, play areas, other developments.
13. Ordinances passed relating to beautification.
14. Active city planning commission and/or city parks commission.

The possibility of such a program being successful in this project may be indicated by the response PRIDE got to one question in its 1969 Long Beach Peninsula Community Development Survey: "Would you cooperate in annual clean-up, paint-up, fix-up efforts of residential and business areas?"

Yes 780, No 34, Don't know 16, No response 19.

Opportunities, needs, problems

In addition to the problems and opportunities discussed above, local people serving on resource committees have identified the following:

1. Encourage good protection and management of wildlife with special consideration for endangered species.
2. Encourage controlled management where wildlife becomes a menace to agricultural and forest crops.
3. Provide public access to rivers in the project area.
4. Develop the lakes of the project area.
5. Encourage beautification in large and small communities and the development of motifs by certain communities.
6. Retain the natural charm and beauty of our area even while attempting to provide the facilities and services required by a growing permanent and transient population.

7. Establish county-wide Park or Recreation Districts in the project area to facilitate planning and development of recreation and beautification.
8. Establish a system of well planned parks, roadside rest and picnic areas, viewpoints, and other recreational facilities in the project area.

WATER

Many small communities need financial help to modernize their sewer and water systems.

KEN BALE PHOTO



WATER RESOURCE CONTENTS

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The Grays Harbor County population is projected to increase considerably by the year 2020 principally in the Aberdeen-Hoquiam area. In Pacific and Wahkiakum Counties steady growth is projected primarily around existing communities but substantial increases are not anticipated (see Tables A-19, A-20, A-21 in appendix). Industrial growth is also projected to locate near existing urbanized areas (see Table A-23, appendix).

Present status municipal water use (see Table A-18, appendix)

Present water use is within the supply capabilities of the existing source developments. The water needs are met by individual wells and small municipal distributor systems. Surface water sources have been developed as the major source of supply for the larger community systems.

The Aberdeen-Cosmopolis system is the largest user with 4.5 mgd (millions of gallons per day). It serves 22,000 persons and has a per capita consumption of 204 gpd. The domestic water supply is obtained by gravity flow from a diversion dam on the Wishkah River. The supply system includes a concrete gravity dam having a storage capacity of 39 million gallons, and a 20 mile transmission line with a capacity of 10 mgd.

The Hoquiam system uses 1.4 mgd in serving 10,500 persons for a per capita use of 129 gpd. The city has three basic sources of supply, including Davis Creek with a maximum estimated flow of 2.88 mgd, the West Fork of the Hoquiam River with a flow estimated at 1.5 mgd. Davis Creek is the major supply. The watershed is for the most part city-owned.

Raymond uses 0.48 mgd, serves 3,700 persons and has a per capita water usage of 120 gpd. Water quality is presently a problem in the Raymond area. The Butte Creek watershed is partially owned by the city, with logging interests owning the remainder. There is no population on the watershed, but logging operations are carried on from time to time, causing degradation of the water quality and creating a potential contamination problem. The South Fork of the Willapa River is less subject to turbidity problems, however, it is warm in the summer, and subject to contamination because the watershed is primarily populated farm land.

The Long Beach-Seaview systems use 0.27 mgd in serving 3,500 persons for a per capita use of 77 gpd. During the summer months the average total demand is doubled due to the heavy recreational use.

1/ Adapted from: M & I Reports of Chehalis Basin and South Coastal Basin, Southwest Washington River Basin Study, 1971 (preliminary report-unpublished), except where noted.

Present status of industrial water use (see Table A-22, appendix)

Almost all of the industrial water supplies obtain their water from surface water sources. The major industrial water users in Grays Harbor County are the Rayonier mill in Hoquiam and the Weyerhaeuser Company in Cosmopolis. They obtain water from the Aberdeen Industrial Water System. The Industrial System obtains its supply from a diversion on the Wynoochee River. The Wynoochee Dam will enhance this system. \$8,800,000 was appropriated to cover construction costs in fiscal year 1971. Completion is scheduled for 1973.

The major user in Pacific and Wahkiakum Counties is the Weyerhaeuser Company in Raymond. The Company owns a private water system but its water use often exceeds the capacity of its supply facilities. During the summer months the supply must be supplemented with water from the Raymond municipal system. Water for drinking and miscellaneous plant uses is purchased from Raymond on a year round basis.

Other industrial water users obtain water from local municipal systems.

Present and future status of M & I water resources

Adequate water sources exist in the project area for all foreseeable requirements of domestic and industrial needs through the year 2020.

The flow of the Chehalis River averages 5,057 cfs at South Elma. The largest tributary streams are the Wynoochee River (771 cfs), the Satsop River (1,922 cfs), and the Newaukum River (476 cfs). The Humptulips River (1,299 cfs) and the Hoquiam River (17 cfs) are tributary directly to Grays Harbor (see Watersheds map following page 134).

The average flow of the Willapa River is 660 cfs, the Elochoman River 374 cfs, and the Naselle River 431 cfs (1959-1967).

The highest flows generally occur during the winter months of November and December with secondary peaks in February and April as a result of snowmelt. The lowest flows occur during the summer months of July, August and September.

Present status of surface water quality

The surface water quality in the project is generally good, however, the lower reaches of the Chehalis River is of poor quality due to the increased development in that area. The water is soft, low in dissolved solids and high in dissolved oxygen concentrations.

During high runoff periods, turbidity is a problem in many streams. Average color values are low, with maximum values around 20 units.

Because most of the streams in the project area originate in the isolated mountainous areas, gross pollution is not likely to occur.

Most of the streams in the project except for the lower reaches of the Chehalis River and the Willapa River have good bacteriological quality. The contamination is attributed to municipal and industrial waste discharges.

Occurrence of ground water ¹/

Ground water supplies in coastal Grays Harbor and Pacific Counties are obtained principally from upland terrace deposits consisting of alternating layers of clay, sand, and gravel, and from beach deposits of sand, silt, peat, and minor amounts of gravel. Locally, along some of the major streams, a few wells produce water for alluvium. The bedrock of the area produces very little water (see Geology map following page 19).

Development of ground water supplies in coastal Grays Harbor and Pacific Counties is limited chiefly to North Beach Peninsula, to the area between Tokeland and Westport, and to the district between Point Brown and Moclips. Moderately large quantities of ground water are used by cranberry growers on the North Beach Peninsula, and in the area between Tokeland and Westport. Nearshore wells are pumped intensively at times when the berry bogs are sprinkled for irrigation, for frost control, and to control heat damage. Little ground water is available along the east shore of Willapa Bay, and not much ground water development has been undertaken on the Quinault Indian Reservation.

The satisfactory yield of a well depends upon maintaining a delicate balance between withdrawals, induced flow, and seasonal recharge.

Losing the balance leads to migration of organically colored and iron bearing water toward the well, as well as possible salt water intrusion.

Bacteriological quality is not presently a serious problem, however, in the rural and un-incorporated areas the shallow wells that serve as a source of domestic supply are subject to contamination from septic tank drain fields (see Agriculture section).

Summary of potential sea-water intrusion problems

No serious problems of sea-water intrusion affecting substantial areas of Grays Harbor and Pacific Counties are likely to occur under the 1968 pattern of development. However, if appreciably expanded development should occur, problems may be expected (1) on the North Beach peninsula, (2) near Cohasset and Westport, and (3) on the Ocean Shores peninsula. Average annual recharge to the ground water reservoir in these areas may be as much as 50 percent of the average annual precipitation, or on the order of 2,000 acre-feet (650 million gallons) per square mile. Because some natural discharge of the fresh ground water is unavoidable,

¹/ Adapted from: Water Supply Bulletin No. 32, Reconnaissance of Sea-water Intrusion Along Coastal Washington, 1966-1968.

pumping withdrawal at the above rate (about 1 3/4 million gallons per square mile) could be expected to lower the water table sufficiently in time to induce serious intrusion, and withdrawal at a considerably lower rate would cause some landward migration of sea-water. However, areas that are bordered on at least one side by permeable materials at higher elevation would receive additional recharge by lateral movement of ground water and could sustain a larger pumpage than could the isolated barrier-bars or narrow peninsulas.

Sea-water intrusion has not been observed in wells in the Tokeland area, but some landward advancement of the salt-water fronts probably has resulted from pumpage to date. The extent to which intrusion may proceed in the future cannot be predicted from the available information but will depend largely on the rate of ground water withdrawal and the accompanying reduction of head in the artesian aquifer.

Present and future water needs

Future water supply requirements in the project area will be determined by the rate of growth of population, industry, and agriculture. Surveys indicate that a steady growth of these factors can be expected through the year 2020 (see Tables A-16, A-17, A-18, A-20, appendix).

Means to satisfy future water needs

It is apparent that water from outside the project area is not needed. However, regional developments should be considered in the urbanized area of Aberdeen-Hoquiam. Increasing urban and recreational growth in the Long Beach Peninsula area along with that area's lack of abundant high quality water, make a regional water supply and transmission system a possibility.

In the future, the major water users are projected to locate around the existing urbanized areas. The increased water use will be met primarily by expanded surface water supplies because high quality ground water in many areas is not adequate to meet large scale development.

The projections for future needs are based on a more economical and efficient use of water as a valuable resource. To provide for the economical use of the present and future water supplies, it is recommended that all systems provide for 100 percent metering, and increased maintenance by the year 1980. Present trends indicate that a program of more economical and efficient use of water tends to stabilize or reduce the per capita consumption.

By 1975 Aberdeen will need to add new sources of supply to meet the requirements of the projected 1980 population. In addition, a parallel increase in both storage and distribution capacity must be provided in order to assist in meeting peak residential demands and fire fighting requirements.

Improvements to both distribution and storage capacities in Hoquiam must be provided to meet the requirements projected for the year 2020.

Abundant high quality water is not available on Long Beach Peninsula. In addition, the growing population and heavy summer recreational development pose potential water supply problems.

It is believed that the ultimate solution to the water needs is a regional water district approach, using surface water as its source. The Bear River (A'chote) is a possible source due to its proximity (5 miles from Long Beach) and flow measurements. However, additional flow and quality data is needed to determine the year round reliability of the stream. A feasibility study of a regional water district is needed. (see Reservoir Sites map following page 134)

The Raymond and South Bend municipal systems have adequate source and storage capacity to meet requirements of the projected population through 2020. However, modifications and improvements must be provided to increase the quality and efficient operation of the systems.

It is recommended that the Cathlamet water supply from the Elochoman River source be expanded by 700 gpm or 1 mgd. The supply facilities and filtration plant presently have a capacity of one-half mgd and a doubling of the supply facilities would be adequate to serve the immediate five-year needs of both Cathlamet and its customers.

Opportunities, needs, problems

In addition to the opportunities, needs, and problems discussed above, local people serving on resource committees have identified the following:

1. Encourage cooperation between groups and agencies to assure that planning for water development in the project area is coordinated and expedited.
2. Promote monitoring and control techniques to eliminate or reduce pollution of our air, water, and soil.
3. Develop adequate multi-purpose water supplies for domestic use, sewer and water, industrial, agricultural irrigation, fish enhancement and recreation.
4. A regular monitoring system for the project streams be devised and activated on a continued basis.
5. Water needs should be projected beyond the year 2020.

(See "Land Use" section for other water related problems.)



GRAYS HARBOR COUNTY		
LOCATION NO.	STREAM	CNI WATER-SHED NO.
21	Charley Creek	0-115
22	Lower R. Fk. Rainey Creek	0-122
23	Upper Pioneer Creek	0-122
24	Upper R. Fk. Rainey Creek	0-122
31	M. Fork Elk River	0-117
33	E. Branch Elk River	0-117
34	Grays Harbor	0-122
36	Leach Creek	0-122
38	Solmon Creek	0-122
39	Little North River	0-122
40	Vesta Creek	0-122
44	Big North	0-122
49	Deep Creek	0-109
63	Rock Creek	6-19
64	Delezena Creek	6-19
65	Workman Creek	6-19
67	Kellogg Creek	6-19
103	Block Creek	6-1
105	Oxbow Site	6-1
106	Falls Creek	6-3
109	Upper North River	0-122
110	Newman Creek	6-4
117	W. Fk. Satsop River	6-2
118	E. Fk. Wishkah River	0-112
119	E. Fk. Humptulips River	0-109
120	Upper W. Fk. Humptulips River	0-109
121	Lower W. Fk. Humptulips River	0-109

WAHIAKUM COUNTY		
LOCATION NO.	STREAM	CNI WATER-SHED NO.
28	Elochoman River	0-67
42	Malone Creek	0-70
66	Mill Creek	0-65

PACIFIC COUNTY		
LOCATION NO.	STREAM	CNI WATER-SHED NO.
1	Lower Naselle River	0-138
2	Upper Naselle River	0-138
3	Upper Solmon Creek	0-139
4	Middle Salmon Creek	0-139
5	Mill Creek	0-126
6	Lower Solmon Creek	0-139
7	Upper Middle Nemoh River	0-130
8	Upper N. Nemoh River	0-129
9	Lower Middle Nemoh River	0-130
10	Lower N. Nemoh River	0-129
11	Polix River	0-128
12	Minnie Creek Site	0-127
13	Lower Canon River	0-128
14	Canyon Creek	0-128
15	Upper Canon River	0-128
16	Williams Creek	0-129
17	Wilson Creek	0-124
18	Word Creek	0-124
19	Upper N. Fk. Polix River	0-128
20	Clearwater Creek	0-133
25	Fall River	0-122
26	Deon Creek	0-122
27	Upper Groys River	0-70
29	N. Fk. Cedar River	0-120
30	E. Fk. Cedar River	0-120
35	Pacific Site	0-122
37	Upper Elkhorn Creek	0-123
41	Whitcomb Creek	0-124
43	Beor Branch	0-137
45	Upper Beor Branch	0-137
46	Lower Solmon Creek	0-122
47	Smith Creek	0-123
48	Rue Creek Site	0-127
50	Little Elk Creek	6-10
51	Elk Creek	6-10
123	Chinook River	0-75
125	N. Nemoh River	0-129

WATERSHEDS IN GRAYS HARBOR, PACIFIC & WAHIAKUM COUNTIES		CNI NO.
NAME OF WATERSHED		
Wynaochee River		6-1
Satsop River		6-2
Cloquallum River		6-3
Newman Creek		6-4
W. Fk. Chehalis River		6-9
Elk Creek		6-10
Block River		6-17
Ookville-Elmo Area		6-18
S. Side Chehalis River		6-19
Abernothy Creek		0-65
Puget Island		0-66
Elochoman River		0-67
Nelson & Alger Creek		0-68
Skomokowa River		0-69
Groys River		0-70
Crooked Creek		0-71
Deep River		0-72
Groys Bay		0-73
Wallicut River		0-74
Chinook River		0-75
Queets River		0-99
Ouinault River		0-101
Roft River		0-102
Comp Creek		0-103
Wreck Creek		0-104
Moclips River		0-105
Copolis River		0-106
Joe Creek		0-107
Boone Creek		0-108
Humptulips River		0-109
Ocean City Area		0-110
N. Bay Peninsula		0-111
Wishkah River		0-112
Huquiam River		0-113
Grass Creek		0-114
SE Groys Harbor		0-115
Johns River		0-116
Elk River Area		0-117
Westport Area		0-118
Grayland Area		0-119
Cedar River		0-120
Takeland Area		0-121
North River		0-122
Smith Creek		0-123
Word Creek		0-124
Willapa Flats		0-125
Willapa River		0-126
S. Fk. Willapa River		0-127
Cannon Creek		0-128
N. Nemoh River		0-129
Middle Nemoh River		0-130
S. Fk. Nemoh River		0-131
Long Island		0-132
Clearwater River		0-133
Ellsworth Creek		0-134
Lower Naselle River		0-135
S. Fk. Naselle River		0-136
Beor River		0-137
Naselle River		0-138
Solmon Creek		0-139
Long Beach		0-140



WATERSHEDS AND POSSIBLE RESERVOIR SITES
COLUMBIA-PACIFIC
RESOURCE CONSERVATION & DEVELOPMENT PROJECT
GRAYS HARBOR, PACIFIC AND WAHIAKUM COUNTIES, WASHINGTON

DECEMBER 1971
1:100,000



PART THREE

PROGRAM OF ACTION

Stream and riverbank erosion is a common and serious problem in the tri-county area.

SCS PHOTO 9-4611-9



Proper channel design and installation of rip-rap will protect banks, prevent loss of soil, reduce sediment in spawning beds.

A-3744-2 SCS PHOTO

Vegetation makes a quick come-back and the fish and wildlife habitat is better than before.

SCS PHOTO 9-4855-3



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INTRODUCTION

Proof that citizens, private groups, and local, state, and federal agencies can work together is no longer lacking. This Resource Action Program is the result of such cooperation.

The RC&D Project will endorse many existing plans and future plans developed by various local and state agencies for functional elements within the project area.

It is not our intent to infringe on the authority or activity of any local, state, or federal agency. It is our intent to give aid and support to the many programs as a means of meeting project goals.

As one RC&D puts it: "There is no limit to what can be accomplished if it doesn't matter who gets the credit."

MAJOR ACTIONS

1. The development of multi-purpose water storage for existing and future municipal, industrial, agricultural and recreational needs.
2. The development of modern sewer and water systems for all the communities of the project area.
3. The development of environmentally acceptable disposal of the solid waste of the project area.
4. The development of land and water resource data for use by city and county planning bodies and individuals and informal groups interested in the wise use of our renewable and non-renewable resources.
5. The conservation of soil resources through acceleration of assistance to landowners for streambank erosion and logging road erosion control.
6. The protection of water quality through acceleration of assistance to individuals, groups, municipalities, industries for pollution control.

PROJECT MEASURE CLASSIFICATION

This section is the action part of the Columbia-Pacific RC&D Project's "Resource Action Program". It contains the project measures that have been proposed by local individuals or groups for the orderly conservation, development, improvement and use of the natural and human resources of the project area. These measures are defined as actions needed to meet the goals (see page 3) of the project sponsors.

The proposed project measures will be investigated in greater detail during the operational phase to determine feasibility, evaluate alternatives and environmental impact. It has not been possible to study more than a few of them in any detail during our developmental phase.

84 measures have been proposed by local people and tentatively approved for action by the Executive Board from the many proposals submitted. The Board has also approved 23 project-wide measures. These measures cover a broad range of resource developments and community improvements.

Each measure is identified by a coded number. The first letter indicates the county; the second letter indicates the resource committee:

Grays Harbor

GC Commerce and Economic Development
(includes Mariculture, and Industry, Commerce, Transportation)

GF Forestry

GH Health, Education, and Welfare

GN Natural Resources
(includes Water, Agriculture, Land Use)

GO Outdoor Recreation
(includes Recreation, Wildlife, Beautification)

Pacific

PA Agriculture

PF Forestry

PH Health, Education, and Welfare

PI Industry, Commerce, Transportation

PL Land Use

PM Mariculture

PR Recreation, Wildlife, Beautification

PW Water

Wahkiakum

WA Agriculture

WF Forestry

WH Health, Education, Welfare

WI Industry, Commerce, Transportation

WL Land Use

WM Mariculture

WR Recreation, Wildlife, Beautification

WW Water

Project-wide

TP Total project

Many additional measures will be needed to adequately meet the goals of the project sponsors. Periodic review and revision is planned so that project measures will be deleted or added at least annually during the course of project operations. The action program is "open ended" so additional measures can be added in the future to meet new opportunities, needs, and problems.

The number following the two letters merely indicates the numerical order in which the measures were received; it does not indicate priority.

We expect to secure the kind of services needed to investigate, plan and install these measures. Carrying out these measures depends upon local interest and willingness to go ahead with them. Project measure proposals will require the coordinated efforts of many agencies. The "team approach" will be used wherever applicable to make the most effective use of technical services. This will provide a unified effort of several disciplines to solve community problems.

CATEGORIES OF PROJECT MEASURES

1. Accelerated Services - Acceleration of a specific phase of an agency's ongoing program in a selected problem area.
2. Critical Area Treatment - Treatment of land areas eroding by wind or water where off-site damages affect the general public.
3. Flood Prevention - Installation of flood prevention structures (including land stabilization measures) designed to control and dispose of flood waters.
4. Farm Irrigation - Installation of irrigation systems
5. Land Drainage - Installation of drainage systems
6. Soil and Water Management for Agriculture-Related Pollutant Control - Installation of soil and water management practices to reduce agriculture-related pollutants.
7. Public Water-Based Recreation - Multi-purpose water-based recreation development
8. Public Water-Based Fish and Wildlife - Single or multi-purpose water-based fish and/or wildlife development.
9. Public Recreation or Fish and Wildlife Developments - Recreation or fish and wildlife development designed to serve the public (water or land-based - for profit or not for profit).
10. Other Water Developments - Usually multi-purpose water impoundments.
11. Special Resource Studies and Inventories (except accelerated service) - Studies and inventories designed to identify problems and/or opportunities that lead to developments or improvements.
12. Highways, Roads, Trails, and Scenic Highways - Transportation arteries associated with resource use and development.
13. Cooperatives, Associations, or Development Corporations - Organization or expansion of cooperatives, associations, or development corporations for purposes of improved advantages in marketing, services,

- production, or purchasing.
14. Agricultural and Forest Product Processing or Marketing Industry - Establishment or expansion of an industry associated with processing or marketing of agricultural or wood products.
 15. Industrial Development (except those associated with Agriculture and Forestry) - Establishment or expansion of an industry that provides additional employment or improved markets.
 16. Public Services and Facilities - Installation of new or additional facilities such as hospitals, schools, water or sewer systems; or establishment of services such as fire fighting, solid waste pickup and disposal, etc.
 17. Educational - Establishing or expanding training or retraining programs.
 18. Other - Includes any other measure such as beautification activities, industrial park, etc.

Types of Project Measures

Project measures have been classified under the following four major headings:

- A. Structural measures: Structural measures ordinarily require community or group action for planning, construction, operation and maintenance, and always require group benefits for justification. These are either PL-566 or other USDA non-PL-566 structures for flood prevention, erosion control, agricultural water management, recreation, or fish and wildlife.
- B. Land use and treatment: Needed land use adjustments and combinations of conservation practices compatible with the needs and capabilities of the land and the objectives of the people involved.
Critical areas: Critical areas are gullies or seriously eroding lands which are sources of excessive runoff or sediment contributing to downstream damages or which, if untreated, would adversely affect structural works of improvement.
- C. Associated measures: Facilities, activities, or enterprises necessary for the utilization, processing, and marketing of natural resource products.
- D. Supporting measures: Developments or enterprises compatible with project goals and involving assistance that is primarily a responsibility of organizations outside the United States Department of Agriculture, even though the measure may involve A,B, or C.

Some measures do not fit the above types or they emphasize acceleration of the above measures:

- E. Accelerated measures: The technical or financial assistance (including loans) of an agency to accomplish something special, above its regular, existing program activities in the project area. Includes inventory data needed to carry out RC&D measures.

RESOURCE GROUPINGS OF SPECIFIC MEASURES APPROVED BY EXECUTIVE BOARD

AGRICULTURE

Structural Measures

Category
(see page 137)

PA-36	To make Ward and Wilson Creek suitable for fishing, save farm land from erosion and reduce siltation of creeks
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2

Accelerated Measures

TP-16	To identify key spawning streams, spawning beds, and critical areas on rivers and provide a total stream conservation program to protect commercial and recreational fisheries(project-wide)
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1

TP-21	To accelerate the control or reduction of agricultural erosion and pollution and reforestation of small landowners through REAP cost-sharing (project wide)
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1

WA-77	To effectively handle animal waste from farms of Puget Island without causing pollution
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6

FORESTRY

Associated Measures

TP-5	To establish small woodworking firms and utilize wood products and by-products, re-manufacture wood products (project wide)
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14

Supporting Measures

TP-17	Endorsement and support of the Washington Forest Protection Association (project wide)
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13

TP-18	Endorsement and support of the Washington Farm Forestry Association (project wide)	13
TP-19	Endorsement and support of the American Tree Farm System (project wide)	13
TP-20	Endorsement and support of the Keep Washington Green Program (project wide)	13
GF-65	To establish a timberland zone to protect and maintain timber resources of Grays Harbor and Pacific Counties	18
PF-68	To preserve some large cedar specimens on Bear River near the proposed Achote Dam site	9

HEALTH, EDUCATION, WELFARE

<u>Supporting Measures</u>		<u>Category</u>
WH-6	To repair and restore the church building as a historical site and community meeting center in the City of Cathlamet	18
WH-7	To construct an addition to the present Wahkiakum Museum building	18
PH-8	To provide a sewage line connecting to the South Bend sewage disposal for the Eklund Park area of South Bend	16
TP-12	To accelerate the various types of resource education programs available and increase the participation (project wide)	18
PH-19	To preserve valuable historical buildings and sites for the benefit of the public and utilize them for cultural and educational purposes at the Fort Columbia Cultural Center	18

TP-22	To insure local historical preservation - preserve significant local history for future generations (project wide)	18
TP-23	To promote the installation and/or modernization of sewer and water systems and fire protection of the project area (project wide)	16
PH-30	To furnish a building that contains historical items relating to Pacific County and provides an educational and recreational experience to residents and tourists	18
PH-39	To utilize the vacant South Bend High School building for the benefit of area people as a health, education, and welfare center	17
WH-42	To install a radio transmitter in either Astoria or Naselle on Radar Hill to provide continuous weather broadcast	18
WH-51	To designate a 100 acre site near Cathlamet High School as a National Environmental Education Landmark and develop it as an environmental education program	17
PH-80	To support Pacific County's need for comprehensive water and sewer plan	11
GH-84	To support Grays Harbor Solid Waste Management Plan Implementation Program	16

Accelerated Measures

TP-3	To accelerate community development by assigning a Cooperative Extension Service specialist to assist communities with identifying their needs and ways to fulfill them (project wide)	18
TP-9	To publish and distribute all pertinent project-wide studies, inventories, evaluations and other reports concerning project resources	11

TP-10	To inform as many individuals and groups in the project area about RC&D using all available media (project wide)	18
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INDUSTRY, COMMERCE, TRANSPORTATION

<u>Associated Measures</u>		<u>Category</u>
PI-70	Establishment of an arts and crafts center to provide jobs, services, and small business income to the Naselle area	13
<u>Supporting Measures</u>		
TP-6	To publish a booklet to inform the public and specialty houses of local arts and crafts availability (project wide)	13
TP-7	To increase public historical information and education and promote tourism through historical re-enactments and community pageants (project wide)	18
TP-8	To provide a vocationally trained labor force for existing or new industries and better utilize seasonal labor (project wide)	17
TP-11	To reduce and/or eliminate highway safety hazards and unsafe situations (project wide)	12
PI-62	To gather data in order to test alternatives and plan the best use and/or protection of the Willapa Harbor estuary, as conducted by the Army Corps of Engineers - model study	11
<u>Accelerated Measures</u>		
TP-2	To make low interest loans available to assist the project economy and establish RC&D measures (project wide)	18

LAND USE

<u>Structural Measures</u>		<u>Category</u>
WL-76	To alleviate streambank erosion and remove debris from the Skamokawa Creek, East and Middle Valley	2
WL-78	To reduce streambank erosion on the Upper Grays River	2
GN-81	To stabilize Lower Satsop Channel and eliminate threat to U.S. Highway 12	2
<u>Supporting Measures</u>		
TP-15	To accelerate flood plain studies to provide data to planners and developers (project wide)	11
PL-71	Construction of a bulkhead at South Bend to halt riverbank erosion and improve business district building sites and increase moorage area for commercial and sport fishing	18
<u>Accelerated Measures</u>		
TP-1	To accelerate land treatment on county roads, private logging roads and critical areas	2
WL-2	To obtain up-to-date soil survey and interpretive data for use by local groups in land use plans, sanitary codes, and treatment of critical areas in Wahkiakum County	1
TP-13	To accelerate the publication of soils information needed to inform the public of soil related problems, limitations, suitabilities in Grays Harbor and Pacific Counties	1
TP-14	To accelerate conservation planning to protect land, water and related resources of individuals, groups, and units of government (project wide)	1
GN-41	To obtain a soil survey of lands within the boundaries of the Quinault Indian Reservation as a basis for making land management decisions	1

MARICULTURE

<u>Supporting Measures</u>		<u>Category</u>
PR-21	To develop a fish hatchery at Naselle Youth Camp to train youths in fisheries and conservation and restore Naselle River as a fishing area	17
GO-27	To install a salmon rearing facility where salmon can be raised commercially	15
PM-45	To restore Ellen Sands as a barrier to ocean swells and provide a suitable disposal area for dredge spoils. Protect Bruceport-Stony Point oyster beds.	18
PH-49	To continue a Sea Resources training facility in Chinook used as a student vocational program	17
GC-52	To establish a marine and oceanographic lab in conjunction with the University of Washington to utilize harbor facilities and potential educational facilities	17
PM-67	To raise razor clam seed for restocking Washington ocean beaches by means of a hatchery at the Willapa Shellfish Laboratory	11
PM-72	To obtain financial assistance for research into all aspects of oyster propagation and provide a dependable, economical source of seed for the local oyster industry	15

RECREATION, WILDLIFE, BEAUTIFICATION

<u>Structural Measures</u>		<u>Category</u>
GO-75	To develop modern picnic and camping facilities, improved roads, improved boating facilities, and to clean the lake and stream feeding Faylor Lake	7

Supporting MeasuresCategory

WR-3	To install recreational facilities for an existing moorage basin at Cathlamet	7
PR-4	To prevent a branch of the Nemah River from eroding the existing public rest area and Highway 101	2
TP-4	To study and develop a project-wide hiking, horseback, bicycle and canoe trails system	11
PR-20	To preserve a stand of timber and provide a recreation area on the Naselle River at the Mill Ranch	9
PR-22	To clean O'Neill Lake of snags, and deepen and utilize for recreational purposes (boating, fishing, swimming)	7
GH-25	To furnish swimming and recreational facilities and activities to the public in the eastern part of Grays Harbor County with a pool and community center	9
GO-26	To clean-up and make navigable the Copalis River for fishing, spawning, small boating, and access to downed cedar trees	2
GO-28	To construct and develop a regional sports and recreational center for multiple-use with the aid of an FHA loan at the Elma Fairgrounds	9
GO-29	To provide a feasibility study of a winter sports area in the Upper Wynochee near the dam site and reservoir	9
PR-32	To develop facilities to utilize the recreational potential of Willapa Bay	7
PR-33	To construct trails and paths for hiking and bicycling at Fort Columbia and Canby. Fuller utilization of existing recreational resources	9

PR-34	To provide safer access to fishing on rocks below North Head lighthouse	7
PR-37	To support a Long Beach Peninsula gun club.	9
PW-38	To develop Leadbetter Point as a natural area for day use by the public and some overnight camping at the south end of the area	9
WR-43	To improve the sanded area along the Columbia River at the Wahkiakum-Cowlitz county line for recreational purposes and provide recreational facilities	7
GO-46	To support a Westport Lions Club recreation park for the general public	9
WR-47	To improve the recreation facilities located at Camp Elochoman, 12.5 miles north of Cathlamet	9
GO-50	To develop a community recreation center at Quinalt for youth and adults where none now exists	9
PR-79	To support the development of a Pacific County Comprehensive Park and Recreation Plan	11

WATER

<u>Structural Measures</u>		<u>Category</u>
WW-5	To halt damage to private property and a public street by control of erosion caused by water from an unknown source at Cathlamet	2
PW-9	To alleviate flooding in the east end of South Bend. Need for culverts and tidegate of proper design under new highway and existing railroad	3
PW-13	To alleviate flooding of residential and agricultural land in the Chinook area	3
PW-14	To alleviate flooding in the Wallicut area - residential and agricultural land	3

PW-17	To alleviate flooding in the Lower Willapa River area	3
PW-18	To alleviate flooding in the Grayland area and still maintain water tables for cranberry growers	3
GN-23	To alleviate flooding of Ocosta area: improve storage ditches, dikes and main channel and install pumping facility	3

Supporting Measures

Category

PW-1	To support the protection of the shoreline from Cape Shoalwater to Toke Point - this will save homes, beaches, State Highway 105	2
PW-10	To provide a dependable, safe, quality water supply to about 50 homes in Balemville from the South Bend water system	16
PW-11	Construction of the A'chote dam and reservoir to provide domestic, industrial and agricultural water, and recreation and fish enhancement	10
PW-12	Construction of the South Fork (Willapa) dam and reservoir for multiple uses in north Pacific County	10
PW-15	A dike to alleviate flooding in the residential and business district of Raymond	3
PW-16	To maintain water tables in the Long Beach peninsula area for cranberry growers and municipal and industrial and other domestic use	11
WW-35	To provide financial and technical assistance for a community water system for Grays River	16
PM-44	To study the water quality in Willapa estuary and rivers to determine the condition of the estuary and its impact on oysters and other mariculture production	11

GN-82	To support the Chehalis River Flood Plain Study in Grays Harbor County	11
GN-83	To support the Copalis River Water Quality Enhancement Plan	11

Accelerated Measures

Category

WW-40	To alleviate flooding on Upper Grays River through studying past flood control works and deter- mining the best flood control methods	11
WW-61	To study the Lower Grays River watershed to determine flood and erosion control needs and alleviate damage to public and private property	11

SHORT TERM WORK SCHEDULE

Estimated RC&D funding needs and a five year schedule will be developed by the sponsors during the annual updating of this program of action.

Priorities for RC&D measures are to be established by the project sponsors. Priorities are expected to change in response to the demands, needs, problems, and opportunities in the area. Priorities are to be reviewed regularly and frequently and revised as appropriate.

The following tentative work schedule covers only those measures with potential for technical or financial assistance with RC&D funds. Within sixty days after authorization for operations an updated work plan is to be prepared by the project sponsors:

1. FIRST YEAR F.Y. '73 July 1, 1972 - June 30, 1973

<u>No.*</u>	<u>Measure Name</u>	<u>Estimated Construction Funding</u>
TP-1	Accelerate land treatment on county roads or private logging roads and critical areas	
TP-14	Accelerate conservation planning assistance to urban and rural indi- viduals in the project area	\$ 5,000**
TP-16	Accelerate Streambank Conservation Program	

*Numerical order

** Includes TP-1, TP-14, TP-16

WL-2	Wahkiakum Soil Survey Acceleration	Technical
PW-9	South Bend and Skidmoore Slough Flood Control	\$25,000
GN-41	Quinault Reservation Soil Survey	Technical
WW-77	Puget Island Agricultural Pollution Control	\$25,000
GN-81	Lower Satsop Channel Stabilization	\$25,000
Total Federal and Local:		\$80,000

2. SECOND YEAR F.Y. '74 July 1, 1973 - June 30, 1974

<u>No.*</u>	<u>Measure Name</u>	<u>Estimated Construction Funding</u>
TP-1	Accelerate land treatment on county roads on private logging roads and critical areas	
TP-14	Accelerate conservation planning assistance to urban and rural indi- viduals in the project area	
TP-16	Accelerate Streambank Conservation Program	\$20,000**
WL-2	Wahkiakum Soil Survey Acceleration	Technical
GO-26	Copalis River Clean-up	\$25,000
PA-36	Ward and Wilson Creek Erosion Control	\$25,000
WW-40	Upper Grays River Flood Control Study	\$50,000
GN-41	Quinault Reservation Soil Survey	Technical
GO-75	Failor Lake Recreation Area	Technical
Total Federal and Local:		\$120,000

*Numerical order

**Includes TP-1, TP-14, TP-16

3. THIRD YEAR F.Y. '75 July 1, 1974 - June 30, 1975

<u>No.*</u>	<u>Measure Name</u>	<u>Estimated Construction Funding</u>
TP-1	Accelerate land treatment on county roads on private logging roads and critical areas	
TP-14	Accelerate conservation planning assistance to urban and rural individuals in the project area	
TP-16	Accelerate Streambank Conservation Program	\$30,000**
WL-2	Wahkiakum Soil Survey Acceleration	Technical
WW-5	Cathlamet Erosion Control	\$ 5,000
PR-20	Mill Ranch Recreation and Old Spruce Stand Preservation	\$15,000
GN-23	Redman Slough Flood Control	\$25,000
GN-41	Quinault Reservation Soil Survey	Technical
WR-43	Wahkiakum-Cowlitz Day-use Recreation	\$15,000
PR-63	Grayland Bridal and Hiking Trail	\$10,000
GO-75	Failor Lake Recreation Area	\$25,000
Total Federal and Local:		\$140,000

*Numerical order

**Includes TP-1, TP-14, TP-16

ECONOMIC STATEMENT

Benefits from the project measures identified by this program of action are many and varied. Development or improvement of resource use, such as a flood protection project, provides direct onsite benefits to the landowners or operator. Direct benefits also accrue to the area from the construction investment for each measure. Measures costing nearly \$5,000,000 have been approved by the Executive Board for some kind of action during the first five years of operations. The following 15 years could see \$30,000,000 worth of projects identified for study and installation. This depends on local interest and support and availability of local, state, and federal appropriations, loans and grants. Much of this investment will be from sources outside the area which would not normally be invested except for the RC&D project.

Benefits are also derived from secondary or associated benefits. Secondary benefits include increased employment opportunities, both during project construction and for their operation and maintenance. Many years of employment resulting from project construction could approximate 360 in the first five years of operation, and over 2,000 in the last 15 year segment. Other associated benefits could include increased employment and profits from handling and processing increased production made possible by those measures concerned with resource development, protection and use.

Other types of economic benefits are the multiplier benefits. Multiplier benefits are brought about when increased employment or additional income allows the beneficiary to purchase goods and services he could not formerly afford. This enhanced purchasing power increases business activity in the immediate or surrounding communities. Thus, it was determined that for every \$1.00 spent on construction \$1.93 will be returned to the project area, due to the multiplier effect.

Primary benefits that should accrue to the area include environmental quality, beautification, pollution control, improved water quality, and improved fish and wildlife resources.

Many of these benefits are extremely difficult or time consuming to measure in monetary terms, and no attempt to do so has been made. However, the value of these benefits is very real to resident and visitor alike.

PROJECT MEASURE INSTALLATION AND IMPLEMENTATION

The Executive Board with the assistance of the resource committee members and cooperating agencies will annually:

1. Review and establish priorities on all applications
2. Assist in the development of annual budgets
3. Prepare annual plans of operation
4. Work with project measure applicants in implementing works of improvement
5. Promote the overall objectives on a continuing basis
6. Evaluate completed projects periodically

The proposed Resource Action Program will be carried out through an annual plan of operations by the RC&D Executive Board. We will reconsider the installation of project measures frequently and will adjust our plans as needed to meet changes in programs and availability of funds.

A work plan will be developed for each project measure involving RC&D financial assistance. This document will provide supporting data and give details on works of improvement, land rights and economic evaluation including costs and benefits.

A project measure agreement will be entered into prior to installation by all parties involved based on the work plan. This will be a formal document that sets forth responsibilities for funding, land rights, contracting, construction, installation services and other requirements.

PROVISIONS FOR OPERATION AND MAINTENANCE

An operation and maintenance agreement will be made that sets forth responsibilities for maintaining works of improvement. Annual operation and maintenance and replacement costs for all works of improvement will be in accordance with the Agreements of Operation and Maintenance for each individual project.

Operation and maintenance costs will be borne by the individual measure sponsors either through taxation, appropriations, or assessments against the persons benefited (user).

The works of improvement will be agreed upon by measure sponsors and will be maintained after installation in the best interests of all concerned.

#

PART FOUR

APPENDIX

GLOSSARY

APPLICANTS: Those individuals, groups or local agencies that have submitted an RC&D measure application concerning a specific opportunity, problem, or need in their community or area.

APPLICATION: Request submitted by project sponsors to Washington, D. C. for official authorization as an RC&D project.

ENDORSERS: Local clubs, groups, organizations who wrote letters in support of the RC&D application.

FUNCTIONAL PLAN: A plan for one of the component parts of a comprehensive and/or Framework Plan such as transportation, water and sewer, housing, recreation. It is prepared by specialists in that particular function at a greater level of detail than that element is treated in a comprehensive plan. Usually funded and staffed through Regional Planning Commissions.

GOALS: Long range purposes of action program, broad in concept, and guided by the policies of the sponsors (as defined by local and state planning circles).

NEEDS: Things that can be done about the problem or what should be done about the existing resource or the adverse trend. A definite solution may not be presently available.

OBJECTIVES: Short range measures to accomplish the broad goals, as guided by the major priorities of the sponsors (as defined by local and state planning circles).

OPERATIONAL AUTHORIZATION: The final authorization by the Secretary of Agriculture which provides funds to the United States Department of Agriculture agencies that will assist the sponsors in carrying out their goals and the individual qualifying measures they have identified.

OPPORTUNITIES: The timing is right for the solution of a problem and the technology exists to overcome the problem.

PLANNING AUTHORIZATION: The initial authorization by Washington, D. C. which provides funds to the Soil Conservation Service to assist the sponsors in developing a resource inventory and action program.

POLICY: Position statement or governing principle that guides a course of action.

PROBLEMS: Those things which we find wrong with an existing resource or which indicate an adverse trend.

PROJECT SPONSORS: Official local units of government that have chosen to sponsor the RC&D project - counties, cities, ports, conservation districts, and the State Soil and Water Conservation Committee.

RC&D MEASURES: Actions needed and proposed by local interest groups for the orderly conservation, development, improvement, and utilization of natural resources of the project area. Includes structural measures, land treatment, associated measures, and supporting measures.

RESOURCE ACTION PROGRAM: A Framework Program containing general inventory information and some evaluations relating to problems, opportunities, needs, as well as possible solutions. It does not contain the degree of completeness or specific determinations needed in a comprehensive plan.

TABLE A TABLE OF GEOLOGICAL HISTORY

ERA	PERIOD	EPOCH	Absolute age in years before present	Major geologic events in United States given in order of increasing age	Distinctive features of plant and animal life	
CENOZOIC	QUATERNARY	Recent		Minor changes in land forms by work of streams, waves, wind	Rise of civilizations	Age of Man
		PLEISTOCENE	10,000	Four stages of spread of continental ice sheets and mountain glaciers	Development of man; extinction of large mammals	
	TERTIARY	PLIOCENE	1,000,000	Cascadian orogeny; Cascade and Sierra Nevada ranges uplifted; volcanoes built	Early evolution of man; dominance of elephants, horses, and large carnivores	Age of Mammals
		MIOCENE	13,000,000	Marine sediments deposited on Atlantic and Gulf coastal plain; stream deposits spread over Great Plains and Rocky Mountain basins; thick marine sediments deposited in Pacific coastal region	Development of whales, bats, monkeys	
		OLIGOCENE	25,000,000		Rise of anthropoids	
		EOCENE	36,000,000		Development of primitive mammals; rise of grasses, cereals, fruits	
		PALEOCENE	58,000,000		Earliest horses	
			63,000,000	Laramide orogeny; Rocky Mountains formed		
MESOZOIC	CRETACEOUS			Marine sediment deposition over Atlantic and Gulf coastal plain and in geosyncline of Rocky Mountain region	Extinction of dinosaurs; development of flowering plants	Age of Reptiles
	JURASSIC		135,000,000	Nevadan orogeny; Intrusion of batholith of Sierra Nevada region		
				Marine sediment deposition in seas of western United States; desert sands deposited in Colorado Plateau	Culmination of dinosaurs; first birds appear	
	TRIASSIC		180,000,000	Palisades disturbance; Black faulting in eastern United States		
				Deposition of red beds in fault basins of eastern United States and in shallow basins of western United States	First dinosaurs; first primitive mammals; spread of cycads and conifers	
PALEOZOIC	PERMIAN		230,000,000	Appalachian orogeny; Folding of Paleozoic strata of Appalachian geosyncline	Conifers abundant; reptiles developed; spread of insects and amphibians; trilobites become extinct	Age of Amphibians
				Deposition of red shales and limestone in southwestern United States; much salt and gypsum; glaciation of southern hemisphere continents		
	CARBONIFEROUS	PENNSYLVANIAN	280,000,000	Deposition of coal-bearing strata in eastern and central United States	Widespread forests of coal-forming spore-bearing plants; first reptiles; abundant insects	
		MISSISSIPPIAN	310,000,000	Deposition of limy, shaly sediments in widespread, shallow seas of central and eastern United States	Spread of sharks; culmination of crinoids	
	DEVONIAN		345,000,000	Acadian orogeny; Folding and igneous rock intrusion in New England	First amphibians; many corals; earliest forests spread over lands	Age of Fishes
				Deposition of thick marine strata in geosynclines of eastern and western United States	First land plants and air-breathing animals; development of fishes	
	SILURIAN		405,000,000	Taconian orogeny; Folding of rocks in eastern United States, Nevada, and Utah		Age of Marine Invertebrates
	ORDOVICIAN		425,000,000		Life only in seas; spread of molluscs; culmination of trilobites	
	CAMBRIAN		500,000,000	Deposition of thick marine strata in geosynclines of eastern and western United States	Trilobites predominant; many marine invertebrates	
			600,000,000			
	Precambrian time; age goes back to over four billion years			Many periods of sediment deposition alternating with orogeny	Earliest known forms of life; few fossils known	

TABLE A-1

<u>NUMBER OF FARMS</u>			
<u>County</u>	<u>1964</u>	<u>1969</u>	<u>Rate</u>
Grays Harbor	756	428	-48%
Pacific	450	298	-34%
Wahkiakum	278	198	-29%

<u>ACRES OF LAND IN FARMS</u>			
<u>County</u>	<u>1964</u>	<u>1969</u>	<u>Rate</u>
Grays Harbor	86,731	59,374	-32%
Pacific	49,504	38,945	-21%
Wahkiakum	27,506	20,849	-24%

<u>AVERAGE SIZE OF FARMS</u>			
<u>County</u>	<u>1964</u>	<u>1969</u>	<u>Rate</u>
Grays Harbor	115	139	+21%
Pacific	110	131	+19%
Wahkiakum	99	105	+ 6%

TABLE A-2 TOTAL CROPLAND (COLUMBIA-PACIFIC RC&D PROJECT) ^{a/}
All Farms

<u>County</u>	<u>Number of Farms with Cropland</u>		<u>Acres of Total Cropland</u>	
	<u>1969</u>	<u>1964</u>	<u>1969</u>	<u>1964</u>
Grays Harbor	393	703	2,409	35,339
Pacific	277	409	17,599	17,233
Wahkiakum	187	270	10,682	13,522
Total	857	1,382	57,690	66,094

^{a/} Adapted from Table No. 1, 1969 Census of Agriculture, United States Department of Commerce, Bureau of the Census.

TABLE A-3 HARVESTED CROPLAND (COLUMBIA-PACIFIC RC&D PROJECT) ^{a/}
All Farms

County	Number of Farms With Harvested Cropland		Acres of Harvested Cropland	
	1969	1964	1969	1964
Grays Harbor	311	496	12,923	15,914
Pacific	277	409	17,599	17,233
Wahkiakum	123	217	3,907	4,885
Total	711	1,122	34,429	38,032

^{a/} Adapted from Table No. 1, 1969 Census of Agriculture, United States Department of Commerce, Bureau of the Census

TABLE A-4 CROPLAND USED ONLY FOR PASTURE OR GRAZING

(COLUMBIA-PACIFIC RC&D PROJECT) - All Farms ^{a/}

County	Number of Farms		Acres	
	1969	1964	1969	1964
Grays Harbor	304	528	15,329	17,561
Pacific	144	221	9,718	8,269
Wahkiakum	164	229	6,652	8,193
Total	612	978	31,699	34,023

^{a/} Adapted from Table No. 1, 1969 Census of Agriculture, United States Department of Commerce, Bureau of the Census

TABLE A-5 IRRIGATED LAND (COLUMBIA-PACIFIC RC&D PROJECT) ^{a/}
All Farms

County	Number of Farms		Acres	
	1969	1964	1969	1964
Grays Harbor	115	96	3,504	2,348
Pacific	123	128	2,708	1,702
Wahkiakum	6	6	343	174
Total	244	230	6,555	4,224

^{a/} Adapted from Table No. 1, 1969 Census of Agriculture, United States Department of Commerce, Bureau of the Census

TABLE A-6 LIVESTOCK NUMBERS (COLUMBIA-PACIFIC RC&D PROJECT)SALES UNDER \$2500/YEAR - Small Farms a/

County	Milk Cows		Other Cattle & Calves (Beef)		All Cattle	
	1969	1964	1969	1964	1969	1964
Grays Harbor	56	306	2,477	5,790	2,533	6,096
Pacific	47	185	1,185	3,951	1,232	4,136
Wahkiakum	18	163	1,473	2,971	1,491	3,134
Total	121	654	5,135	12,712	5,256	13,366

a/ Adapted from Tables No. 7 and 17, 1969 Census of Agriculture, United States Department of Commerce, Bureau of the Census

TABLE A-7 LIVESTOCK NUMBERS (COLUMBIA-PACIFIC RC&D PROJECT) a/

Sales \$2500/Year and Over (Class 1 - 5 Farms)

County	Milk Cows		Other Cattle & Calves (Beef)		All Cattle	
	1969	1964	1969	1964	1969	1964
Grays Harbor	5,146	6,700	8,319	7,190	13,465	13,890
Pacific	1,222	1,481	5,987	4,788	7,209	6,269
Wahkiakum	2,376	2,579	4,526	3,805	6,902	6,384
Total	8,744	10,760	18,832	15,783	27,576	26,543

a/ Adapted from Table No. 17, 1969 Census of Agriculture, United States Department of Commerce, Bureau of the Census

TABLE A-8 OTHER LIVESTOCK NUMBERS (COLUMBIA-PACIFIC RC&D) a/

All Farms

County	Sheep & Lamb		Hogs & Pigs		Horses & Ponies		1971 <u>b/</u>
	1969	1964	1969	1964	1969	1964	
Grays Harbor	425	402	92	41	364	--	2,659
Pacific	27	55	31	56	157	--	560
Wahkiakum	34	50	5	21	94	--	250
Total	486	507	128	118	615	--	3,469

a/ Adapted from Table No. 7, 1969 Census of Agriculture, United States Department of Commerce, Bureau of the Census

b/ 1971 Cooperative Extension Service Survey

TABLE A-9 LIVESTOCK NUMBERS (COLUMBIA-PACIFIC RC&D PROJECT) a/

All Farms

County	1969	1964	1969	1964	1969	1964
Grays Harbor	5,202	7,006	10,796	12,980	15,998	19,986
Pacific	1,269	1,666	7,172	8,739	8,441	10,405
Wahkiakum	2,394	2,742	5,999	6,776	8,393	9,518
Total	8,865	11,414	23,967	28,495	32,832	39,909

a/ Adapted from Table No. 7, 1969 Census of Agriculture, United States Department of Commerce, Bureau of the Census

TABLE A-10 POULTRY NUMBERS (COLUMBIA-PACIFIC RC&D PROJECT) a/

All Farms

County	Chickens 3 Months Old or Older		Hens & Pullets of Laying Age	
	1969	1964	1969	1964
Grays Harbor	3,506	31,905	3,411	20,069
Pacific	1,997	12,640	1,917	10,230
Wahkiakum	293	1,539	265	1,161
Total	5,796	46,084	5,593	31,460

a/ Adapted from Table No. 7, 1969 Census of Agriculture, United States Department of Commerce, Bureau of the Census

TABLE A-11 MARKET VALUE OF ALL AGRICULTURE PRODUCTS SOLD EXCLUSIVE OFFOREST PRODUCTS (COLUMBIA-PACIFIC RC&D PROJECT) a/ - All Farms

County	Dollar (\$) Value Agriculture Product		Dollar (\$) Average Per Farm	
	1969	1964	1969	1964
Grays Harbor	\$ 5,329,190	\$ 4,404,685	\$12,972	\$5,960
Pacific	3,097,205	1,800,565	10,839	4,221
Wahkiakum	2,063,425	1,573,115	10,835	5,774
Total	\$10,489,820	\$ 7,778,365	\$11,549 (AV)	\$5,318 (AV)

a/ Adapted from Table No. 4, 1969 Census of Agriculture, United States Department of Commerce, Bureau of the Census

TABLE A-12 PORT OF GRAYS HARBOR FISH & CRAB HANDLED AT WESTPORT BASE-1970

Month	Salmon Tons	Other Fish Tons	Crab Dozen
January			14,630
February		9.87	102,475
March		14.20	110,323
April	48.95	43.79	74,885
May	206.25	142.35	73,609
June	199.24	160.23	18,219
July	285.95	291.73	9,691
August	358.23	207.57	6,901
September	218.66	144.98	
October	252.73	69.12	
November	83.48	3.10	
December		2.10	
Total	1,653.49	1,089.04	410,733

Year	Tons Fish	Fish Value	Doz. Crabs	Crab Value	Total Value
1961	1,039.39	\$ 799,759	111,123	\$ 413,378	\$ 1,213,137
1962	1,453.89	1,250,976	106,871	620,707	1,871,683
1963	1,522.85	787,628	97,225	559,042	1,346,670
1964	1,472.75	733,576	70,982	393,526	1,127,102
1965	1,936.89	910,464	186,247	853,763	1,764,227
1966	1,958.83	888,637	284,442	989,859	1,878,496
1967	1,949.25	1,030,552	182,560	705,412	1,735,964
1968	2,002.52	1,258,061	183,879	763,473	2,021,534
1969	2,038.09	1,437,512	529,494	3,037,180	4,474,692
1970	2,742.53	2,033,343	410,733	1,774,370	3,807,713
Totals	18,116.98	\$11,130,508	2,163,556	\$10,110,710	\$21,241,218

TABLE A-13 ANNUAL PRODUCTION OF SALMON, CRAB, AND OYSTERS WITH SOMEPRODUCT VALUES FOR THE YEARS FROM 1935 THROUGH 1970 FROMWILLAPA BAY, WASHINGTON

Year	Salmon		Crab		Oysters	
	Pounds	Value	Pounds	Value	Pounds	Value
1935	1,017,276		684,842		4,141,000	
1936	1,145,181		865,194		5,301,800	
1937	1,024,285		1,441,352		7,036,900	
1938	1,032,879		1,831,716		7,395,500	
1939	661,881		2,153,496		7,019,400	
1940	982,619		3,341,754		8,175,700	
1941	1,729,904		3,968,152		9,899,800	
1942	2,503,988		2,134,818		8,934,200	
1943	1,233,116		1,052,550		5,895,300	
1944	927,616		1,529,196		6,480,400	
1945	1,097,222		1,439,204		7,131,400	
1946	1,472,857		2,031,544		10,779,100	
1947	849,557	212,389	3,822,288	802,680	8,475,500	
1948	1,206,771	1,956,262	4,233,108	1,658,713	6,995,000	211,055
1949	886,066		3,204,240		4,624,900	
1950	1,673,555		1,375,788		4,350,800	
1951	1,875,111		1,830,528		5,096,800	
1952	1,852,586		1,892,842		6,232,200	
1953	1,581,397		3,035,435		6,588,600	
1954	1,849,490		3,333,543		5,980,021	
1955	1,439,978		2,457,479		5,652,186	
1956	1,061,501		4,082,936		6,151,362	
1957	735,081		3,196,881		5,787,025	
1958	935,304	132,026	2,300,403	324,931	5,440,457	1,090,935
1959	887,215	172,157	2,446,493	335,193	5,025,137	890,188
1960	667,037	163,419	2,222,101	332,811	4,633,372	819,643
1961	543,284	132,454	1,912,222	295,319	3,987,706	894,803
1962	581,299	119,935	1,372,678	280,634	4,824,893	834,893
1963	295,280	62,218	2,204,679	492,443	4,264,438	840,353
1964	559,703	110,604	1,406,597	327,766	3,977,580	677,736
1965	473,330		1,643,301		3,477,062	
1966	422,127		2,882,102		3,505,428	
1967	533,489		3,177,958		3,023,064	
1968	477,652		2,810,513		3,430,447	
1969	773,249	298,158	4,341,330	1,003,543	3,101,149	1,096,822
1970	1,143,977		2,416,824		3,495,417	

TABLE A-14 SINGLE, PEAK INSTANTANEOUS COUNTS OF PEOPLE
ON THE PRINCIPAL RAZOR CLAM BEACHES AT LOW TIDE ^{a/}

(In Numbers of People)

Year	Long Beach		Twin Harbors Beach		Copalis Beach		Mocrocks Beach		Total
	People	Date	People	Date	People	Date	People	Date	
1958	3,900	Aug. 17-Sun.	5,967	May 4-Sun.	5,682	June 22-Sun.	--	--	15,549
1959	6,328	May 24-Sun.	9,656	May 24-Sun.	9,109	May 24-Sun.	533	May 24-Sun.	25,626
1960	7,316	July 15-Sun.	6,968	June 12-Sun.	8,929	May 15-Sun.	785	July 10-Sun.	23,998
1961	5,308	July 2-Sun.	4,532	July 2-Sun.	9,508	July 2-Sun.	950	July 2-Sun.	16,476
1962	4,495	May 6-Sun.	3,354	June 24-Sun.	8,627	May 6-Sun.	--	--	16,476
1963	6,026	May 26-Sun.	6,159	May 26-Sun.	11,356	May 26-Sun.	2,028	June 23-Sun.	25,571
1964	6,833	July 11-Sat.	6,180	July 12-Sun.	9,488	July 11-Sat.	1,140	Aug. 9-Sun.	23,641
1965	3,879	July 4-Sun.	4,167	May 30-Sun.	8,064	May 30-Sun.	1,693	May 30-Sun.	17,805
1966	4,772	July 4-Mon.	4,855	June 19-Sun.	8,494	May 8-Sun.	1,300	May 8-Sun.	19,421
1967	4,500	July 23-Sun.	4,912	June 25-Sun.	7,765	May 27-Sat.	2,175	May 27-Sat.	19,655
1968	5,365	May 12-Sun.	5,111	May 12-Sun.	7,803	May 12-Sun.	2,506	June 12-Wed.	20,785
1969	6,814	May 31-Sat.	6,600	June 1-Sun.	16,016	May 31-Sat.	5,900	May 31-Sat.	35,330
1970	7,779	May 23-Sat.	6,400	June 20-Sat.	17,573	May 23-Sat.	8,830	June 20-Sat.	40,582

^{a/} Total number of razor clam diggers during a low tide period of approximately 3 hours equals 1.30 to 1.45 times the instantaneous count.

TABLE A-15 MUNICIPAL WATER USE FOR 1970 (COLUMBIA-PACIFIC RC&D) ^{a/}

System	GPCD	Population Served	Ave. Use; Industrial & Domestic in MGD	Surface Water Use (MGD) Domestic			Ground Water Use (MGD) Domestic		
				Ave. Daily	Max. Monthly	Max. Daily	Ave. Daily	Max. Monthly	Max. Daily
Aberdeen ^{b/}	272	22,000	6.00	6.00	7.50	11.99	--	--	--
Hoquiam	124	10,500	1.55	1.35	1.89	2.32	--	--	--
Montesano	75	3,600	0.25	--	--	--	0.25	0.39	0.75
Elma	295	2,500	0.75	--	--	--	0.75	1.05	1.70
Westport	287	1,500	0.43	--	--	--	0.43	0.62	1.06
Oakville	213	470	0.16	--	--	--	0.10	0.14	0.30
Raymond	131	3,670	0.91	0.45	0.67	0.89	--	--	--
Long Beach	77	3,500	0.27	0.27	0.43	0.55	--	--	--
South Bend	360	2,000	0.72	0.72	1.01	1.29	--	--	--
Naselle	230	870	0.20	0.20	0.25	0.75	--	--	--
Iliwaco	262	650	0.17	0.17	0.23	0.43	--	--	--
Chinook	250	400	0.10	0.10	0.13	0.18	--	--	--
Ocean Park	133	600	0.05	--	--	--	0.05	0.12	0.15
Cathlamet	132	1,900	0.25	0.25	0.35	0.44	--	--	--
Total	--	54,160	11.81	9.54	12.79	17.59	1.64	2.32	3.96

^{a/} Adapted from Table No. 1, M & I Report of Chehalis and South Coastal Basins, Southwest Washington River Basin Study (unpublished)

^{b/} Includes Cosmopolis

(All figures are rounded)

GPCD = Gallons per capita per day

MGD = Millions of gallons per day

TABLE A-16 MUNICIPAL WATER USE FOR 1980 (COLUMBIA-PACIFIC RC&D) ^{a/}

System	GPCD	Population Served	Ave. Use; Industrial & Domestic in MGD	Surface Water Use (MGD) Domestic			Ground Water Use (MGD) Domestic		
				Ave. Daily	Max. Monthly	Max. Daily	Ave. Daily	Max. Monthly	Max. Daily
Aberdeen	142	24,200	3.14	3.14	4.08	5.65	--	--	--
Hoquiam	142	11,600	1.73	1.50	1.95	2.70	--	--	--
Montesano	142	4,000	0.51	--	--	--	0.51	0.67	0.93
Elma	142	2,800	0.36	--	--	--	0.36	0.47	0.65
Westport	142	1,700	0.22	--	--	--	0.22	0.30	0.39
Oakville	142	500	0.07	--	--	--	0.07	0.09	0.12
Raymond	142	4,000	1.00	0.53	0.68	0.95	--	--	--
Long Beach	142	3,900	0.50	0.50	0.80	1.25	--	--	--
South Bend	142	2,200	0.29	0.29	0.37	0.52	--	--	--
Naselle	142	960	0.12	0.12	0.16	0.22	--	--	--
Ilwaco	142	720	0.09	0.09	0.12	0.16	--	--	--
Chinook	142	440	0.12	0.12	0.16	0.22	--	--	--
Ocean Park	142	660	0.09	--	--	--	0.09	0.11	0.15
Cathlamet	142	2,100	0.27	0.27	0.35	0.49	--	--	--
Total	--	59,780	8.51	6.56	8.67	12.16	1.25	1.64	2.24

^{a/} Adapted from Table 12, M & I Report of Chehalis and South Coastal Basins, Southwest Washington River Basin Study (unpublished)

(All figures are rounded)

GPCD - Gallons per capita per day

MGD - Millions of gallons per day

TABLE A-17 MUNICIPAL WATER USE FOR 2000 (COLUMBIA-PACIFIC RC&D) ^{a/}

System	GPCD	Population Served	Ave. Use; Industrial & Domestic in MGD	Surface Water Use (MGD) Domestic			Ground Water Use (MGD) Domestic		
				Ave. Daily	Max. Monthly	Max. Daily	Ave. Daily	Max. Monthly	Max. Daily
Aberdeen	162	29,300	3.81	3.81	4.95	6.86	--	--	--
Hoquiam	162	14,000	2.10	1.82	2.36	3.27	--	--	--
Montesano	162	4,800	0.62	--	--	--	0.62	0.81	1.14
Elma	162	3,400	0.44	--	--	--	0.44	0.57	0.79
Westport	162	2,000	0.26	--	--	--	0.26	0.37	0.47
Oakville	162	600	0.08	--	--	--	0.08	0.11	0.15
Raymond	162	4,800	1.19	0.63	0.82	1.13	--	--	--
Long Beach	162	4,700	0.61	0.61	0.98	1.52	--	--	--
South Bend	162	2,700	0.35	0.35	0.43	0.62	--	--	--
Naselle	162	1,200	0.15	0.15	0.20	0.27	--	--	--
Ilwaco	162	570	0.11	0.11	0.15	0.23	--	--	--
Chinook	162	540	0.13	0.13	0.17	0.23	--	--	--
Ocean Park	162	800	0.10	--	--	--	0.10	0.14	0.19
Cathlamet	162	2,500	0.33	0.33	0.43	0.60	--	--	--
Total	--	72,210	10.28	7.94	10.51	14.70	1.20	2.00	2.72

^{a/} Adapted from Table 13, M & I Report of Chehalis and South Coastal Basins, Southwest Washington River Basin Study, (unpublished)

(All figures are rounded)

GPCD - Gallons per capita per day

MGD - Millions of gallons per day

TABLE A-18 MUNICIPAL WATER USE FOR 2020 (COLUMBIA-PACIFIC RC&D) ^{a/}

System	CPCD	Population Served	Ave. Use; Industrial & Domestic in MGD	Surface Water Use (MGD) Domestic			Ground Water Use (MGD) Domestic		
				Ave. Daily	Max. Monthly	Max. Daily	Ave. Daily	Max. Monthly	Max. Daily
Aberdeen	178	35,500	4.61	4.61	6.00	8.30	--	--	--
Hoquiam	178	16,900	2.53	2.20	2.86	3.96	--	--	--
Montesano	178	5,800	0.76	--	--	--	0.76	0.95	1.36
Elma	178	4,100	0.53	--	--	--	0.53	0.69	0.95
Westport	178	2,400	0.32	--	--	--	0.32	0.44	0.57
Oakville	178	800	0.10	--	--	--	0.10	0.13	0.18
Raymond	178	5,900	1.43	0.76	1.00	1.37	--	--	--
Long Beach	178	5,600	0.73	0.73	1.17	1.82	--	--	--
South Bend	178	3,200	0.42	0.42	0.54	0.75	--	--	--
Naselle	178	1,400	0.18	0.18	0.24	0.33	--	--	--
Ilwaco	178	1,100	0.14	0.14	0.18	0.25	--	--	--
Chinook	178	650	0.14	0.14	0.19	0.26	--	--	--
Ocean Park	178	970	0.13	--	--	--	0.13	0.16	0.22
Cathlamet	178	3,100	0.40	0.40	0.52	0.72	--	--	--
Total	--	87,420	12.42	9.58	12.70	17.76	1.84	2.40	3.78

^{a/} Adapted from Table 14, M & I Report of Chehalis and South Coastal Basins, Southwest Washington River Basin Study (unpublished)

(All figures are rounded)

CPCD - Gallons per capita per day

MGD - Millions of gallons per day

TABLE A-19 INDUSTRIAL WATER USE FOR 1970 (COLUMBIA-PACIFIC RC&D) ^{a/}

Name	Location	Type	Source	Ave. Daily MGD	Max. Monthly MGD	Max. Daily MGD
Rayonier	Hoquiam	Pulp	Aberdeen Industrial Supply	40.00	41.00	42.00
Weyerhaeuser	Cosmopolis	Pulp	Aberdeen Industrial Supply	29.00	32.00	35.80
Others	In Chehalis Basin	Assume wood related	-----	10.40	11.40	13.00
Weyerhaeuser	Raymond	Lumber	Old Armstrong Creek	7.35	8.10	9.20
Others	In S. Coastal Basin	Assume wood related	-----	0.13	0.20	0.23
Total				86.88	92.70	100.23

^{a/} Adapted from Table 2, M & I Report of Chehalis and South Coastal Basins, Southwest Washington River Basin Study (unpublished)

MGD - Millions of gallons per day

TABLE A-20 PROJECTIONS OF TOTAL INDUSTRIAL WATER USE (MGD)COLUMBIA-PACIFIC RC&D ^{a/}

Year	Chehalis Basin (Grays Harbor, etc.)		South Coastal Basin (Pacific, Wahkiakum, etc.)	
	Average Daily	Maximum Monthly	Average Daily	Maximum Monthly
1970	79.4	84.4	7.5	8.3
1980	117.0	138.0	10.2	12.1
2000	151.0	178.0	13.1	15.4
2020	164.0	193.0	14.2	16.8

^{a/} Adapted from Table 9, M & I Report of Chehalis and South Coastal Basins, Southwest Washington River Basin Study (unpublished)

All projections obtained from Appendix XI "M & I Water Supply", Columbia-North Pacific Region Comprehensive Framework Study, August 1970.

MGD - Millions of gallons per day



